AN HBJ PUBLICATION

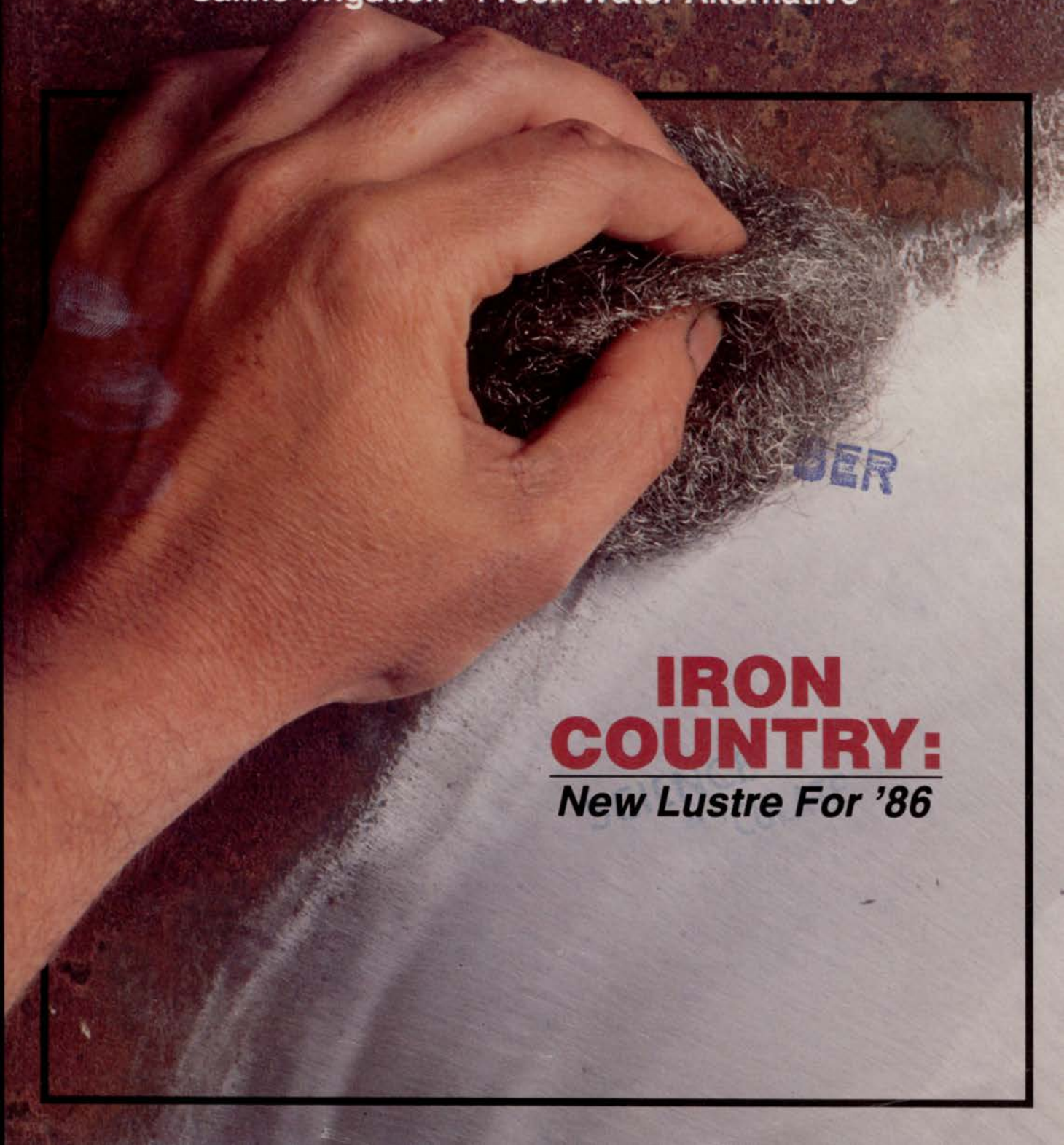
JULY 1985/$2.00

WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

Petrovic on Wetting Agents

Saline Irrigation - Fresh Water Alternative



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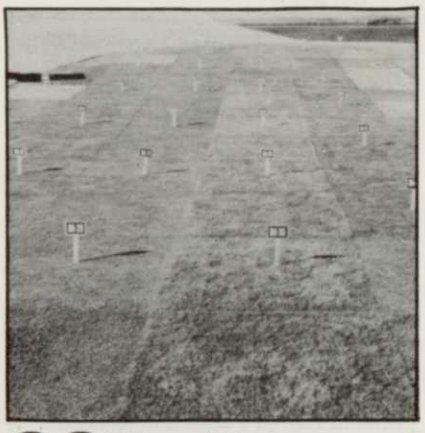
JULY, 1985 VOLUME 24, NUMBER 7

WEEDS TREES & TURF

The Magazine of Landscape and Golf Course Management Since 1962

24 New Lustre to Iron Country

Competition has made the commercial turf equipment market bigger and better. Manufacturers discuss new additions to their lines.



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52 Spring Grove's Lofty Legacy

An arboretum-like cemetery is the crown jewel of the Queen City and a source of pride to the grounds crew who keep it shining.

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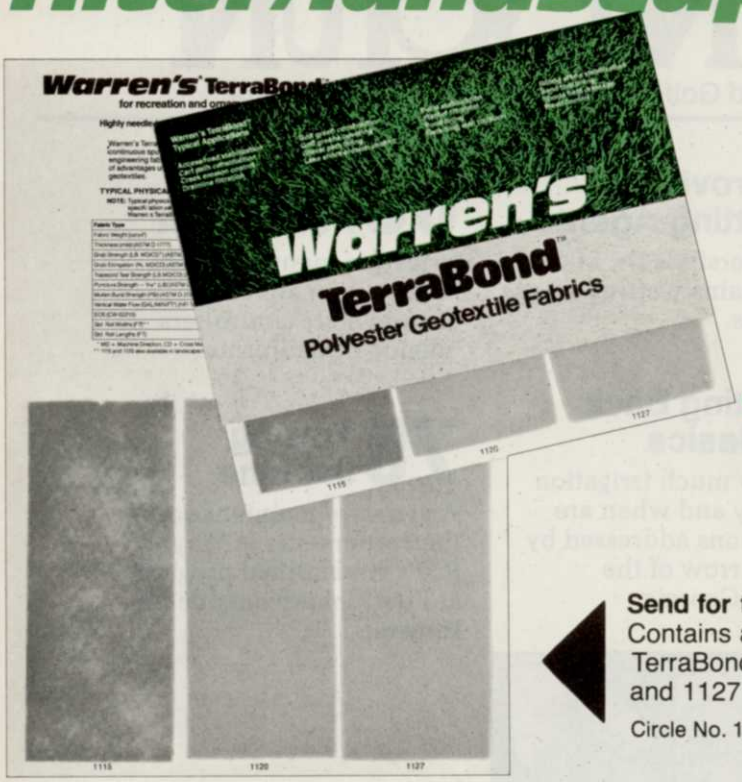

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Liability insurance rates jump

If you apply pesticides and haven't received a liability insurance bill recently, be prepared for a shock. Negative publicity about pesticides and falling interest rates are causing insurance companies to increase premiums, in some cases doubling or tripling them.

Large corporations, such as ChemLawn and Orkin, have developed self-insurance programs. Small companies, on the other hand, find it virtually impossible to develop sufficient reserves in case of a serious mistake and lawsuit.

Some pesticide applicators are opting for higher deductibles to moderate liability insurance premium increases. Others aren't worried as much about higher premiums as they are about availability of coverage in the future. A structural pest control operator said he could get by if insurance premiums increased from one percent of sales to five percent, but without insurance he would have to close his doors.

Smaller applicators should explore group plan options. Then, perhaps, they could develop self-insurance reserves like the big firms.

Reentry period for granulars eyed

Post-treatment reentry period differences between liquid and granular pesticides could cause a shift to liquids, Stanley Sweir, turf entomologist for the University of New Hampshire said in that state's Turf Talk newsletter.

Sweir said the Environmental Protection Agency is looking closely at liquid and granular formulations of Ciba Geigy's Triumph for reentry period differences. The agency, according to Sweir, is considering a 14-day reentry period for the granular and 'until dry' for the liquid applied formulation.

Delays longer than a few minutes or hours are impractical for commercial applicators. If EPA persists in sticking granulars with reentry periods, Sweir questions whether any new granular formulation will ever be approved for turf.

Baby boom to create a golf boom

As baby boomers reach the 35 to 54 year age group, they will swell the lines at first tees across the U.S., predicts Joe Beditz, National Golf Foundation Director of Research.

Beditz is predicting a 75 percent increase in middle-aged golfers by 2000.

"Our statistics tell us the greatest potential market is with the relatively young adult age group," says NGF President David Huebner. "If the percentage of players in that group could be increased over the next five years, it could generate a substantial multiplier effect as golfers move into the older age categories." NGF is planning promotions to increase the number of golfers to 21.2 million by 2000.

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Drought beleaugers Delaware River Basin

Drought conditions in New Jersey, and portions of Pennsylvania, and New York are expected to continue through the summer and into the fall.

Hardest hit is the Delaware River basin where 15 million people live.

George Klenk, an official with the New Jersey Bureau of Water Resources, tells WEEDS TREES & TURF, "the long range forecast doesn't make us optimistic that the situation will improve significantly in the near future."

New Jersey, suffering a 35 percent drop in capacity of its reservoirs and going into its peak water usage period, declared a water emergency in mid-April, an action followed days later by 16 counties in east Pennsylvania and portions of southwest New York.

"It could very easily be the worst drought we've ever experienced in eastern Pennsylvania," says Dave Masek of that state's department of environmental resources. Lawn watering, other than newly seeded or sodded lawns, is forbidden in the stricken counties, while the owners of private gardens or landscaped areas are allowed to water by handheld hose with automatic shutoff valves or bucket only from 5 p.m. to 9 a.m. As of press time, commercial nurseries were exempt from the regulations in Pennsylvania.

Conditions in New Jersey resulted in the closure of 2 million acres of public and private woodlands in hopes of heading off what is feared will be the worst forest fire season since 1963, and a 12-agency task force recommended residents limit themselves to 50 gallons of water each day.

As conditions in New Jersey worsened by late spring, the irrigation of golf course fairways was forbidden and tees and greens were allowed water only from 3 a.m. to 5 a.m. on odd numbered days. Nurserymen were asked to water their stock by handheld hoses for an hour on even numbered days. Lawn irrigation, other than on newly installed sod, was curtailed.

In New York, Mayor Edward I. Koch called on residents to take quicker showers and flush toilets less often.

Similar restrictions were imposed in southeast Florida earlier this spring, and this at a time when local governmental bodies in northwest Ohio and southeast Michigan begged for relief from the opposite problem, too much water from Lake Erie which was at a historically high level.

EDUCATION

Shade tips help turfgrass

Shade is a problem for the development of healthy grass, Keith Karnok, Agronomy Department, University of Georgia, told attendees at the recent Southeastern Turfgrass Conference.

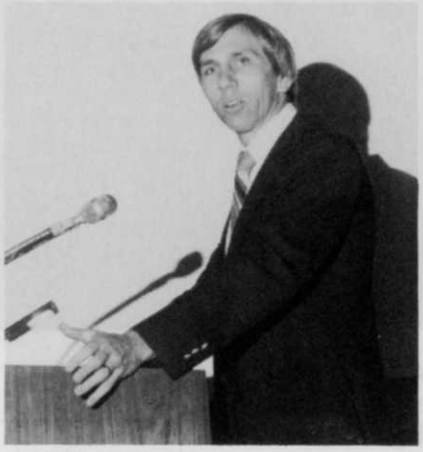
Karnok says turf managers can make their jobs easier if they understand why. A Pennsylvania study indicates as much as 20 percent of all turfgrass is maintained under some shade.

Karnok says shade has three immediate effects on turf: 1. It reduces light intensity and removes "quality" light; 2. It restricts wind movement, resulting in a higher relative humidity and a better environment for diseases; 3. It puts turfgrass in competition with trees for water and nutrients.

Good management coupled with the planting of the right types of turfgrass can offset these handicaps somewhat, he explains.

St. Augustine, centipedegrass and zoysiagrass are some of the best warm-season grasses for shade conditions, while tall fescue and Kentucky bluegrass top the cool-season shade list.

Karnok recommends infrequent but deep irrigation, higher mowing heights ("you want as much leaf surface as you can get"), and the avoidance of too much nitrogen which he claims stimulates leaf growth without a corresponding strengthening of the root system.



Keith Karnok

By selectively pruning limbs of nearby trees, sun flecking is increased helping the turf. And by removing underbrush air circulates more freely which reduces the chances of turf disease.

CHEMICALS

Pesticide and fertilizer sales at $3.3 billion

Manufacturers' sales of pesticides to commericial users jumped from $1.2 to $1.9 billion since 1981, reports the research and marketing firm of Charles H. Kline & Co., Fairfield, NJ.

Reasons? Kline points to the rapid growth of the chemical lawn care industry (turf and grounds accounted for 53 percent of the consumption), increasing numbers of pest control operators, and the growing popularity of slow-release fertilizers.

"Some leading manufacturers are placing greater emphasis in developing new products for professional use as opportunities in agricultural applications mature," Kline & Co. reports. "Many of the same products used on crops find rapid acceptance here, provided manufacturers are aware of the market needs."

Overall, about 125 companies offer some 350 different formulations for professional end uses. Pesticides account for 60 percent of commercial dollar sales in 1984, fertilizers the balance of 40 percent, the report states.

The consumer market for pesticides, fertilizers, potting soils, and soil conditioners was pegged at $1.4 million. Insecticides, spurred by the growth of household products, accounted for about 38 percent of sales and was the largest category. Fertilizers, previously the leader, ranked second with 36 percent total sales.

Kline & Co. says the consumer industry will grow at "a relatively moderate rate" but it won't be until 1989 that consumer sales of pesticides and fertilizers reach the $1.9 billion figure already reached by sales for professional end uses. Together, consumer and commercial sales of pesticides approached $3.3 billion in '84.

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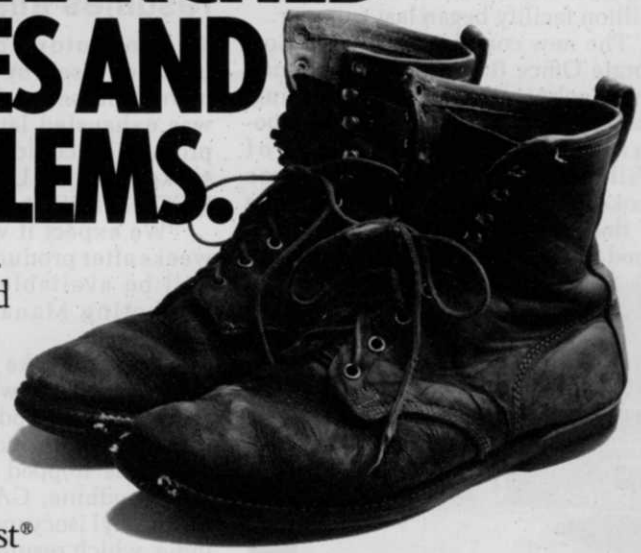

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GROWTH

Davey Tree builds new headquarters

About 160 administrative and technical service employees of the Davey Tree Expert Co. are moving to new corporate headquarters on a 54.5-acre site near Kent, OH. Work on the $4.5 million facility began last summer.

The new complex includes a Corporate Office Building and a Human and Technical Resources Building. Design of the buildings is contemporary with a suggestion of Williamsburg, says a Davey Tree spokesman. The "naturalistic" setting of the 22 acres that are being developed is the responsibility of the landscape architectural firm S.W.A. Group, Houston, TX.

Davey's offices had been spread across upper floors of several connecting buildings in downtown Kent, OH.

INDUSTRY

Temik production resumes this month

The inventory of Temik 10g, a pesticide used by large-scale ornamental nurseries for insect control, was exhausted late this spring, but production could resume in July, a spokesman for Union Carbide tells WEEDS TREES & TURF.

"We expect it will be about four weeks after production begins that it will be available to consumers," Marketing Manager Larry Baird reports.

Temik 10g, like the more concentrated Temik 15g which is used in agriculture, was produced from methyl isocyanate. Production by the company was stopped early this year at the Woodbine, GA, plant following the methyl isocyanate leak in Bhopal, India, which resulted in an estimated 2,000 deaths.

Baird says Union Carbide does not anticipate a price increase when Temik becomes available again.

GOVERNMENT

Long Island village 'regulates' landscapers

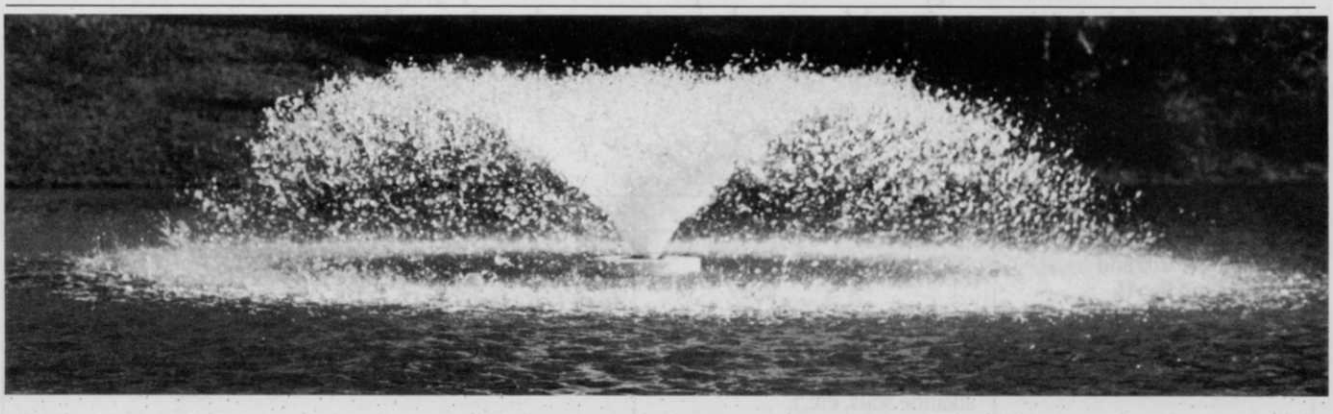
Old Westbury on Long Island, NY, despite opposition from landscape and tree care representatives, recently passed legislation regulating the Green Industry in that village.

Included in the ordinance is a provision calling for the pre-notification at least 72 hours in advance of all property owners within 300 feet of the spraying of pesticides.

"If they make it stick it'll set precedents for other communities," says Don Lehman of Lehman Tree, Upper Brookville, NY, who termed the legislation "devastating and totally unrealistic."

Jon Hickey, in nearby Hicksville, NY, and another member of the American Society of Consulting Arborists, Inc., tells WEEDS TREES & TURF he feels the ordinance "is not enforceable."

The new law licenses grounds companies that work in the village. As part of the procedure each contract



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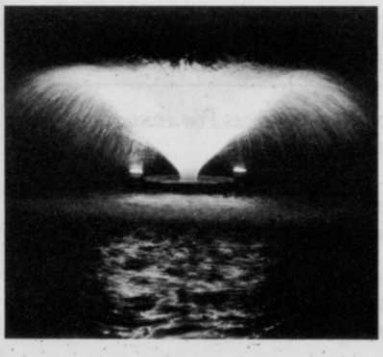

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lawn care operator, arborist, or landscaper must submit two photographs of "each employee" of his/her firm. Workmen must have the license, or a photocopy signed by the licensee, in their possession on a job site.

The ordinance also forbids contract work on Sunday, sets the hours for work from 8 a.m. to 5 p.m. Monday through Friday and 9 a.m. to 5 p.m. on Saturday, outlaws the blowing or raking of leaves or other debris onto roads, and stipulates that "no equipment shall be filled or refilled except over a dropcloth or other device designed to catch and retain any accidental spillage."

A spokesman for the affluent community noted for its large estates tells WT&T "gypsy" operators who park their equipment on village streets and create safety concerns with their spraying led to the ordinance.

As of press time the New York State Pesticide Users Council (NYSPUC) was considering an injunction against the implementation of the village law. NYSPUC President James Taylor says New York courts ruled in 1983 that the regulation of the application of pesticides is a function of the Department of Environmental Conservation and not of individual communities.

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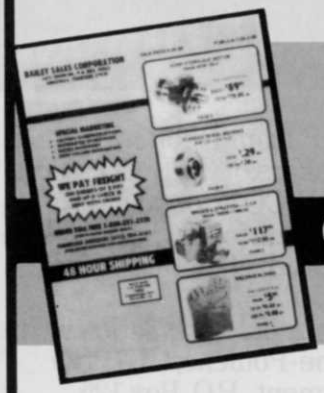

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FUNGICIDES

Half-rate mixing harms blight control

Dr. Houston Couch, professor of plant pathology at Virginia Tech, says mixing half rates of fungicides for pythium blight control to avoid resistance can backfire.

"When a half rate of one fungicide by itself is not enough, half of another fungicide added to it still equals zero," Couch says. "Not only does the mixing of half rates fail to provide an additive effect, but the use of Subdue and Banol at their borderline levels for disease control actually increases the possibility of resistance developing. To my knowledge, there is no written recommendation that advises using tank mixes of fungicides at half-label rates for disease control."

Couch says resistance to fungicides in turf is "unusual" and recommends preventative applications of Subdue or Banol to control pythium blight, starting in early to mid-July or when the combination of temperature and humidity equals 150 or more.

Adds Couch, "those who are concerned about the possibility of resistance can alternate applications of Subdue and Banol. The important thing to remember is not to reduce the rates from the label and not to apply more than one fungicide for the same disease at the same time."

PESTICIDES

EPA looking into use of diazinon on turfgrass

The Environmental Protection Agency is looking into the use of the pesticide diazinon on turf as a result of reports of wildlife kills.

A ruling about restricting use of diazinon on turf could be reached yet this year, an EPA spokesman tells WT&T.

This spring, Henry G. Williams, environmental conservation commissioner of New York State, termed the improper use of diazinon "a nationwide problem".

In a letter to the EPA he said a poll of fish and wildlife agencies turned up 54 incidents of wildlife mortality in 17 states involving 23 species of birds. The species involved in the largest number of incidents was the Canada goose (26), followed by mallard (12),

brant (5), and pigeon (4). More than half of the 54 cases involved turfgrass applications of diazinon, Williams says.

Williams asked for the following steps:

—A stronger label warning to the effect that diazinon should not be used on areas where waterfowl feed.

—Further research under field conditions to better assess how the use of diazinon affects wildlife.

—Better investigation and documentation of wildlife mortality incidents which may involve pesticides or other toxic chemicals.

Speaking of diazinon, a source in the EPA says, "The EPA has authority to restrict a product in its entirety or in certain uses. In this case it's turf. The manufacturers have made some labeling suggestions. Right now we're in the process of determining if we've got enough data to make a determination."

Peter Gradoni of the New York DEC says turf managers should use pesticides other than diazinon in areas of where wildlife, particularly waterfowl, feed.

IRRIGATION

Reagan wields pick in Toro installation

President Ronald Reagan and two others used picks and shovels for three days this spring as a Toro irrigation system was installed at Reagan's adobe ranch house in Rancho del Cielo, north of Santa Barbara, CA.

The Toro system with pop-up sprinkler heads irrigates a 1,000 sq. ft. pasture area for horses adjacent to Reagan's ranch. The system, which was primarily dug by machine, carries water from Reagan's private well.

Toro's Irrigation Division is located in Riverside, CA.

CHEMICALS

PBI–Gordon to fund MCPP re-registration

As re-registration for the turf herbicide mecoprop (MCPP) fast approaches, it appears that PBI-Gordon will be picking up the tab.

"We (PBI-Gordon) are basically in the middle of this," notes J.S. "Skip" Skaptason, a PBI-Gordon vice-president. "We've known it was coming for 10 years."

The company is doing work on a multi-million dollar data base for MCPP. "It's not inexpensive," Skaptason says, "but much of it (money for data), has already been spent. This is a

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UPDATE

FIFRA revisited: Bad dreams don't go away

When Harper's Ferry fizzled out last year many hoped the issue had died a lobbyist's death. Hope increased when the chairman of the House Subcommittee on Department Operations, Research and Foreign Agriculture, George Brown (D—California) was replaced.

Like a bad dream, the legislation, backed by William Proxmire in the Senate, returned this spring and hearings have begun. The Green Industry is there, however, testifying against the inequity of local ordinances and the oversight of local governments to the ignorance and danger of the do-it-yourselfer.

Robert Miller, vice president of technical services for Chemlawn Services Corp., Columbus, OH, spelled out the situation during hearings in late May. "Local pesticide regulations are having a harmful and discriminatory impact on the ability of our members to continue to provide a safe, convenient and cost competitive alternative to the do-it-yourselfer use of outdoor products."

Most pesticides applied by professional lawn care companies are classified for general use under FIFRA (available to the do-it-yourselfer). Ironically, ordinances promoted by these individuals typically do not apply to the larger do-it-yourself market segment...where, because of a lack of training in the use of pesticides, the possibility of mishap is the greatest."

Miller outlined five problems with current pesticide regulation and urged the subcommittee members to limit the power of uninformed, ill-equipped local governments.

Miller's first point was the lack of uniformity among local pesticide ordinances and the problems this causes companies operating in more than one area. Second was the absence of scientific expertise at the local level causing pesticide regulation to be political rather than factual. Third, local governments lack adequate enforcement capability for laws they create and these laws cause an unjustified loss of public confidence in professional lawn care.

Fourth on Miller's list was the misperception that most professional products are more toxic than do-it-yourselfer products. Local governments, therefore, wrongly provide incentives to the do-it-yourselfer over the professional. Finally, Miller said current local pestcide ordinances are an unjustified burden on commerce.

3PF flags supervision rule

The Pesticide Public Policy Foundation, a non-profit lobbying organization for professional pesticide applicators, is alerting the industry to possible changes in FIFRA for on-site supervision by a certified pesticide applicator.

In a very thorough report on FIFRA, 3PF Executive Director David Dietz said the President favors a simple reauthorization of current FIFRA rather than the overhaul involved in Harper's Ferry.

problem we've been working on for a long time. We've been prepared for it."

MCPP is used on sports and ornamental turf for selective control of surface-creeping broadleaf weeds such as red and white clovers, chickweed, knotweed, plantain, dandelion and ground ivy, and in cereals, alone or in a mixture with other plant growth products.

Skaptason declined to give an exact figure for the cost of passage.

"MCPP is the most important herbicide in turf," Skaptason says. "Nothing does as good of a job. We will work with the people who make it for us."

The process MCPP will be going through for re-registration is similar to the passage of 2,4-D, which will cost approximately $3 million.

A prerequisite for re-registering MCPP involves a "call-in" to the EPA, expected to begin this month.

In a call-in, the EPA requests additional information and studies (usually specific, such as environmental or toxicology), along with a response from the company that they plan to either provide the information, rely on others to provide it, combine with others to provide it, or cancel.

Companies have 90 days to respond to the EPA. All companies who have MCPP registrations will get notice from the EPA.

"This one looks like it may be a very, very expensive call-in," says Ray Russell of Dow Chemical, which also as an MCPP registration; Russell's guess is $4 million to $7 million.

"It just doesn't look like the product is worth the expense," Russell continues. "Dow will not assist in financing the call-in. We have determined that it is not something we can afford to do."

Russell notes that the EPA already has a lot of data on the product stored away, and that the remaining work required is almost complete.

The re-registration will involve two data call-ins, according to Skaptason. One relates to groundwater.

"We and people that we work with think we have all the information to answer that problem," he says. The second is the actual re-registration.

The requirement for re-registration evolved from a federal insecticide act in 1972 which imposed a new set of standards on the amount of data necessary to establish safety requirements. The act allowed all of the old products to stay in the channels of trade, while requiring the EPA to systematically go though the files, examine the data and bring the insecticide up to the new standards.

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IN-THE-MIDDLE

Pre-registrations up 30% for Expo

The Second Annual International Lawn, Garden & Power Equipment Expo seems to be on its way toward a record 12,000 attendees. Pre-registrations for the show, July 29-31, in Louisville, KY, are up more than 30% over last year.

Retail and wholesale outdoor equipment dealers and distributors from across the U.S. and from seven foreign nations will arrive at the Kentucky Fair & Exposition Center this summer. They will include buyers from Sears, J.C. Penney, Wal-Mart, Singapore, Venezuela, Germany, Italy, France, Spain, Holland, and your own home town.

Although the Expo is predominately consumer products, the commercial equipment and chemical companies have decided they should be represented too. Some commercial equipment manufacturers are finding consumer dealers make good commercial distributors.

The international nature of the show reflects the growing import market in the U.S. as well as the domestic models for the coming year.

A few landscape contractors have been seen roaming the aisles of the Expo to get a jump on planning. An extra benefit is the outdoor demonstration area where equipment can be operated by distributors, dealers, and their potential customers. More than 150 outdoor equipment companies will have demonstration models available this year.

The Kentucky Fair and Exposition Center has actively sought the "special customer" for this year's show. The only problem is hotel space can be hard to find for those three days. Interested persons should contact KFEC immediately, (502) 366-9592.

Andersons distributors sales soar

It's not unusual for one of The Andersons agricultural outlets to sell more than $250,000 in fertilizers and chemicals in one year, but now its turf distributors are starting to do it.

The Maumee, OH, partnership honored its first $300,000 Tee Time distributor recently, C.O. Lowe Sales of Columbus, OH. Clarence Lowe's 30 years in turf and eight years as a distributor are paying off and made Lowe the first Tee Time distributor admitted to Andersons $300,000 Club.

Not far behind Lowe is Turf Products Ltd. of West Chicago weighing in at $200,000. A group of distributors joined the $100,000 Club: Outdoor Equipment Co., Maryland Heights, MO; Turf Specialty, Hooskett, NH; Lethermans Inc., Canton, OH; Cory Orchard Supply, Indianapolis, IN; Big Bear Equipment Co., Eldridge, IA; and Thorton-Wilson, Maineville, OH.

The Andersons has also been test marketing a hose-end weed and feed product for homeowners through its own stores and K-Mart. It is actively seeking new compounds for the turf market.

In-the-Middle covers the turf and landscape distributor and dealer. Distributors are invited to send news items to Weeds, Trees & Turf, 7500 Old Oak Blvd., Cleveland, OH 44130.

PBI-Gordon has been evaluating MCPP for use with crops. "By our standards we have almost enough data to put it in with crop use as well as turf," Skaptason says.

Other companies which use MCPP include W.A. Cleary, SDS Biotech and Rhone-Poulenc.

PEOPLE

Names in the news

Dr. Bruce Augustin, a member of the WT&T editorial advisory board, has been promoted to associate professor of ornamental horticulture at the University of Florida's Institute of Food and Agricultural Sciences in Ft. Lauderdale. Augustine has been at the U of Fla. the past five years and is the extension turf and water specialist.

Dr. James Miller's appointment as head of the Extension Agronomy Department is causing some reshuffling in the University of Georgia Turfgrass program. Miller had been responsible for weed control in turf and ornamentals in the extension service.

Louisiana native **Dr. Mike French**, who joined the department in 1978 and is now in Athens, GA, is taking over some of Dr. Miller's duties. Also assuming responsibility for weed control in turf and ornamentals is **Dr. Roy Bullock**, a three-year member of the staff who handles weed control in southeast Georgia.

In related news, **Dr. Robert Carrow**, a well-traveled Michigan native, is joining the Georgia Agronomy Department as a turf physiologist. He served as an assistant professor in the Plant and Soil Department at the University of Massachusetts and in the Horticulture Department at the University of Kansas prior to coming to the Southeast where he focuses on soil compaction and turf irrigation management.

Jim Lipari, who spent 26 years with the Upjohn Company, has joined International Seeds, Inc., Halsey, OR, where he will be concentrating on trade shows as well as calling on golf course superintendents and athletic field managers.

On May 1 **Carl A. Totemeier**, garden columnist for the Sunday weeklies editions of *The New York Times*, joined the New York Botanical Garden as vice president for horticulture. Since 1974 he has been director of Old Westbury Gardens in Long Island, NY.

Also in New York, **Mark E. Sosnowitz** has been named president of Northeastern Corporate Landscape in Armonk. **Emerson Vorel Jr.** takes over as director of operations.

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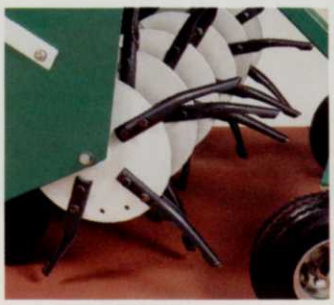

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Ford compact tractors

Ford 1000 Series tractors give you powerful working capacity with compact-size maneuverability for a wide range of mowing, loading and site preparation needs.

There are six models, from 13 to 32 engine horsepower. These hard-working diesels come standard with 540 rpm PTO, 10 or 12-speed transmission, full-time live hydraulics, and a Category I three-point hitch.

Options include front-wheel drive. Hydrostatic or synchronized manual shuttle transmission, depending on model. Creeper speeds. Turf tires, and more. Over 50 matching attachments and implements are available.

Ford commercial mowers

These mowers are designed for grounds maintenance professionals with sunup to sundown work schedules.

Top of the line is a 16-horsepower, 5-forward speed workhorse that cuts a 48-inch swath, with turn-on-a-dime maneuverability for mowing around trees, shrubs and other obstacles. The optional sulky provides sit-down comfort for mowing large lawn and turf areas. A twin-cylinder Briggs & Stratton Industrial/Commerical engine delivers plenty of power to take heavy growth in stride.

For mowing and trimming smaller areas, Ford offers two rear-discharge 21-inch commercial mowers, one self-propelled and one push-type.

Ford mid-range tractors

Ford Series 10 tractors are engineered for excellent performance, ease of operation and all-around versatility.

Choose from ten diesel models from 34.3 to 86 maximum net engine horsepower. Standard equipment includes 3-point hitch, independent PTO, and power-assist steering on most models.

Options include front-wheel drive, synchromesh transmission, turf tires, and more.

Ford also offers 40.5 and 60 maximum net horsepower low-center-of-gravity Series 10 tractors (shown below) designed to work on hilly and rolling terrain.

Industrial tractors

A Ford industrial tractor or tractor-loader may be your best choice for site preparation and other heavy-duty work.

Four diesel models are available from 48 to 60 SAE net horsepower. Tractor-loaders offer up to 4,500 lbs of lift capacity, with single-lever loader control.

Choose from three transmissions—4-speed torque converter, dual-range 8-speed, or manual reversing 6x4.

Ask your dealer about the Ford Extended Service Plan. ESP covers many specific repairs for 36 months or 2,500 operating hours, whichever comes first. At a modest cost, it's smart protection for your rig.

Ford tractor-loaders

There's a Ford loader available to extend the versatility and year-around capabilities of every Ford tractor power size. Each offers a wide choice of buckets.

Quik-Tach models for many tractors make for great flexibility. Quick and easy mounting lets you work with the loader in the morning, and "park" it to mow and haul in the afternoon.

Ford also offers many other attachments for grounds maintenance work: rotary cutters, flail mowers, front and rear blades, landscape rakes, scoops, posthole diggers and more. See your Ford Tractor dealer for complete information.

Ford compact loaders

Ford Load Handlers pack a lot of muscle into a very compact, highly maneuverable package.

Five models range from the 20-horsepower CL-25 to the 64-horsepower CL-65 that can lift a 2,000-pound load. They're all equipped with diesel engines.

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SPORTS TURF

An ounce of PR goes far

Providing quality athletic turf is a juggling act.

Public relations is where many turf managers—particularly park people—fumble. They can't (or won't) talk with the users of the facilities they maintain.

Mike Golden, parks superintendent of sports-rich Chesterfield County on the outskirts of Richmond, VA, says public relations go hand-in-hand with sound agronomic practices. To Golden, persuasive communication is the grease that prevents screechs of unrealistic expectations.

"Groups such as school officials, little league commissioners, and coaches need education as to what can and cannot be done with turfgrasses," says Golden.

"If they are involved in the early planning of new facilities or of a maintenance program, they are likely to be more cooperative than if policies are dictated to them."

The payoff can be more volunteer manpower and funds for the purchase of materials and equipment, he points out.

Chesterfield, one of the fastest growing areas of Virginia with 170,000 residents, numbers 109 baseball diamonds, 20 football fields, and 43 soccer pitches. One season ends, another begins. Complicating matters, central Virginia is in the so-called transition area where some turf managers overseed baseball fields with cool-season grasses in the fall, and sprig or sod football and soccer fields with Bermudagrass in late May or June (Golden says Vamont looks good in his area).

By meeting with the users of the various facilities, Golden's department establishes firm dates for the start and end of each season, giving his crews the opportunity to restore the turf on the then-unused fields. The key word here is "firm".

"I guess it all started out when some of the baseball people where getting on the infields of the ball diamonds when they were still muddy. And then they were asking why they weren't as good as they should be," Golden recalls. "Now they're keeping people off the fields until they're ready. We're starting to work with the football and soccer people also."

Golden concedes the art of providing grass sports fields "is never perfect." Good PR can help smooth out some of the rough spots.

Ron Hall

by Ron Hall, assistant editor

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Circle No. 116 on Reader Inquiry Card

NEW LUSTRE FOR IRON COUNTRY

Manufacturers expand commercial turf equipment market and rebuild distribution in the wake of Deere.

by Bruce F. Shank, executive editor

Competition has made the commercial turf equipment market better than most experts thought it could be two years ago.

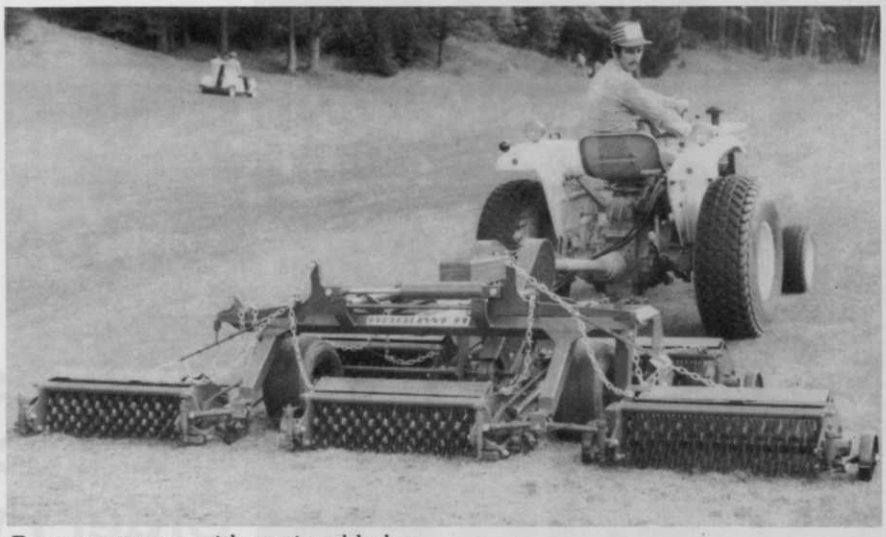
Once considered mature, or even stagnant, the commercial mower market appears to be gaining a lasting strength, defying the predictions of doubtful analysts.

The amazing walk-behinds

For example, five years ago only five companies manufactured walk-behind commercial rotary mowers (32-inch and up); Bobcat (Ransomes), Bunton (Goodall), F. D. Kees, Sensation, and Yazoo. Today, 14 companies make them and all seem to be going strong. The new list includes the big manufacturers, John Deere, Ford, Jacobsen, and Toro, as well as Exmark, a company recently created to capture part of the expanding walk-behind market. Scag recently announced it has entered the walk-behind market.

Dick Lehman, vice president of Ransomes, is impressed with the continued growth of the walk-behind rotary market. "We expected the huge increase in competition (in the walk-behind market) to hurt our veteran Bobcat line, but it hasn't," Lehman told *Weeds Tree & Turf*. "Orders keep pouring in and we keep expanding our plant. It's amazing!"

Stan Byers, president of Bunton, the original manufacturer of walk-behind commercial mowers, is equally impressed with the strength of the market. "We know from replacement sales that there must be more than 70,000 commercial mowing contractors in the U.S.," claims Byers. "We also know from our distributors that sophisticated hobbyists are buying commercial walk-behinds when



Brouwer 5-gang *with verticut blades.*

The Cushman *Front Line*

Jacobsen G4X4 *with fine cut flail.*

Deere's 930 *turf tractor.*

they used to buy lawn tractors. Certainly the market is far from saturated."

Deere liked Bunton's expertise in this rapidly growing market so much it bought 20 percent of the company. Bunton supplies Deere with walk-behind mowers and Deere makes its own riding rotaries. Byers hopes to manufacturer more products for Deere.

Today's turf tractor

The other hot market is the riding out-front rotary, called turf tractors in the trade. These highly maneuverable, three or four-wheel mowers cutting from 48 to 72 inches, are rapidly gaining popularity with both commercial and institutional buyers who up to now have been buying tractor-mounted belly rotaries.

Turf tractors cut the grass ahead of the wheels, reduce the amount of trim work following mowing, and are faster and more maneuverable than standard tractors or out-front rotaries with sulkies.

Toro's Groundsmaster and Jacobsen's Turfcat established this market but the competition is getting stiff. Companies like Excel, Howard Price, and Grasshopper attribute much of their growth to turf tractors. Bunton, Cushman, Deere, Heckendorn, Kut-Kwik, Ransomes, Scag, Sensation, Smithco, Steiner, Walker, and White also have entries in this market.

Howard Price, saying the commercial cutter market is growing 'by leaps and bounds', has his engineers working on ways to make his turf tractors more reliable than his competition by incorporating hydraulics and a new direct drive system to eliminate belts.

Multipurpose tractors

The turf tractor, combined with hydraulics, is spawning a third market, the multipurpose landscape tractor.

Quick detach couplings and hoses allow landscape managers to switch a turf tractor from rotary to flail or reel, to a brush or snowthrower, and, in the future, to a vacuum, aerifier, or verticutter. The possibilities are vast, allow the landscape manager to get more out of his investment, and take away some of the advantages of the less efficient standard tractor.

International connections

The multipurpose turf tractor is getting much of its impetus from technology already existing in Europe and the U. K. When Ransomes purchased Bobcat it brought some of these concepts to the U.S. Since then, Bunton has purchased 85 percent of JL Tractor in Denmark, Jacobsen has imported its G4x4 from Switzerland, and Sensation now imports a West German turf tractor. Deere has plants in Mannheim, Germany, and Toro has signed trade agreements with companies in Australia and South America.

Ransomes, the oldest mower manufacturer in the world, has vast experience in the reel market in Europe and England. The U.S. park and athletic field market resembles the European market more each year making Ransomes' experience more valuable.

Jacobsen's imported G4x4 has a low center of gravity for stability on slopes and four-wheel steering to reduce tire wear on turf. Front and rear PTO attachments permit a wide variety of uses.

Sensation previewed its new import at the Golf Course Superintendents Show in Washington, D.C., in February. It is also maneuverable and features easy implement changeover.

International ties provide more than new technology, they are a fulcrum for exchange rates. U.S. mower manufacturers export as well as import. The high dollar makes U.S. products comparatively expensive to

foreign buyers. This has crimped exports by some U.S. companies.

If the dollar weakens the export market should improve, but then imports become more expensive. The only way for companies to have a hedge for both a strong or weak dollar is to be an international company like Ransomes, Bunton, and Deere. Expect to see more international deals in the next few months.

Testing the upper limits

Turf equipment manufacturers, while battling each other in the highly competitive walk-behind and turf tractor markets, are also testing the upper limits of the market. Price tags over $30,000 are no longer restricted to agricultural equipment.

Five companies, not including the highway market, have turf products breaking the $30,000 mark today; Bunton/JL, Howard Price, Jacobsen, Ransomes and Toro. These entries, like Jacobsen's HF-15 and Toro's HTM-175, are seven-gang, hydraulic reel units designed for golf courses and parks. They can be purchased with all the comforts of an agricultural tractor and are also multipurpose.

Herb Bunton said the large, multipurpose turf tractor developed when the agricultural market in Europe became depressed in the mid-70's. Manufacturers started seeking other markets for their equipment. Bunton/JL's tractor features cutting height adjustment from inside the tractor, quick implement conversion, and greater operator comfort.

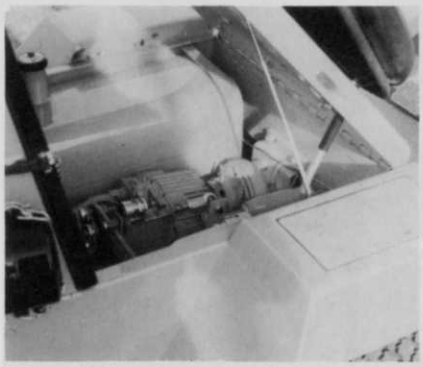
"We've discovered you don't sell these units on the first call," says Byers. "But, in time, they sell themselves despite the high price tag. Golf courses and parks see the benefit of a large, multipurpose machine."

Other up and comers

The popularity of walk-behind rotaries and turf tractors extends to reels. Triplex greens mowers spend more time on fairways than they do greens today. The majors (Jacobsen, Ransomes, and Toro) are sharing new sales in this area with Bunton's Japanese imports, Locke, National, and Howard Price.

Tee mowers are seen today in the trucks and trailers of lawn care companies. National and Locke are attacking this expanding market as well. Reels cut prestige turf better than rotaries and are more popular in warm season markets, especially California.

Jacobsen is wandering from the pack slightly with a soon-to-be-announced emphasis on fine-cut flail mowers. Jake vice president Tom Carter says flails take less energy to operate than rotaries and represent less of a hazard in pedestrian areas. Mott, Vrisimo, Mathews, Middlesworth, and Vemco have served the flail market up to now. Educating reel and rotary users about improved cutting quality is a mission Jacobsen hopes to achieve.



Direct drive *eliminates belts on new Howard Price Turf Blazer.*

Reels cut prestige turf better than rotaries and are more popular in warm season markets, especially California.

The multiple use turf tractor is helping the reel gang market. The majors and Roseman have dominated this market for years. But, in the last few years the names Brouwer, Jerry Clipper, and most recently, LESCO can be found on reel gangs on golf courses, sod farms, and highway right-of-ways.

But rotary makers are fighting back by adding wings on turf tractors and boosting horsepower. Excel and Howard Price are especially active in this area. They boast of simplicity, better cut in tall grass, and less equipment maintenance.

All types of mowers are beginning to benefit from hydrostatic drive. "Hydrostatic models will dominate the mower market if the price difference between it and manual shift comes down," claims Howard Day, vice president of marketing for Yazoo. Forward and reverse by a simple foot pedal may be the wave of the future.

Engine choices grow

"Engine options are one of the toughest decisions we have to make," stresses Exmark President Robert Martin. "We have to consider the serviceability as well as other engine properties."

Briggs & Stratton continues to dominate the small engine market. Its engines are found on more than 80 percent of most small commercial equipment. Kohler, Onan, Tecumseh and Robin are also found on commercial equipment.

Starting a few years ago, Honda mounted a challenge to Briggs and gave other engine manufacturers hope of capturing a bigger piece of the U.S. market. Italian, Japanese and German engine manufacturers are all trying. In the meantime, Briggs has responded to the challenge with significant new models.

Manufacturers typically offer a choice of two engines on smaller equipment; Briggs and Honda. That appears to be changing and a wider selection of engines may be offered in the future.

Tecumseh may have found the back door to the U.S. market with a German company it owns, JLO. The two-cycle JLO offers longer life and better performance on slopes than four cycle engines. Of course, it also requires oil/gas mixture and the exhaust is more visible.

The distributor difference

The most dramatic event in the past two years in the commercial turf equipment industry was Deere's entrance into the commercial turf market with 3,000 dealers. It is causing all manufacturers to reevaluate their distribution.

Deere is educating a vast new group of customers through both its urban and rural dealerships. In reality it is opening up new frontier for its competitors at the same time. As Deere's Bob Tracinski explains, "The Deere dealer is a neighbor, not a travelling salesman. He is part of the community and in touch with his customers on a weekly basis. Add to that the service, parts availability, and availability in case of complaints, and you have something no other company has."

Bunton's Stan Byers and Toro's Denny Brown caution there is a distinction in the case of golf course sales. "You can't have 5 or 10 dealers calling on the same golf course," says Byers. "The superintendent would go crazy!" Brown states, "The upscale consumer and small commercial cutter are being discovered by dealers as new products for them become available. But, in most cases, the dealer can't provide the type of support a golf course or big equipment user needs."

continued on page 29

A PREVIEW OF OUR COMPETITORS' 1989 MODELS.

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For extra value the OVM120XL Xtra-Life engine has tri-stage air cleaning, extra bearings and hardened journals. Tecumseh covers the OVM120XL with the new 2'N10 year limited warranty. It's the longest warranty in the industry, two years on the engine and ten years on the electronic ignition.

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IRON *continued from page 26*

Toro is carefully rethinking its distribution to serve both the big equipment buyer and the commercial cutter. "It's really a market by market decision," says Brown. "We recognize the need for more representation in certain locations, such as rural areas or cities with a high number of small commercial cutters."

Brown indicated one-step distributors are preferable to two-step dealers where practical. This has been especially apparent in distribution of chemicals to cost sensitive markets such as lawn care. The second markup for the dealer can lose the sale in many instances. It is yet to be determined how price sensitive these same lawn care companies will be as they expand into mowing.

As the Toro name was dropped from the last formerly company owned distributor this year, Bunton was buying one of its distributors in New Jersey.

"Sales increased more than 20 fold after we took control," Byers pointed out. "It's really a matter of putting a motivated individual in charge of the distributorship, and who is more motivated than the manufacturer?" Bunton is also its own distributor in its home territory, Louisville.

Another off-target prediction the past two years is the demise of the short-line distributor. "Short-line distributors have never had as many products to sell as they do today," claims Howard Price. "Some consumer dealers are upgrading to distributors. Dealerships abandoned by our competitors and agricultural manufacturers (International Harvester and Case) are anxious and equipped to handle commercial equipment."

Ransomes is very satisfied with its 31 distributors carved out after Ransomes bought Bobcat. The Bobcat line was carried by an assortment of Toro and Jacobsen distributors prior to the addition of the Ransomes reel products. "Our sales have increased dramatically with both our new and old distributors," boasts Lehman.

Quest for full lines

Once the distributor or dealer is established, turf equipment manufacturers want to provide a full line of products.

Deere has made this its primary mission for commercial products. Although the company was not willing to announce its new products before it notifies its dealers this September, it would say the number of introductions will set a record for the company.

Howard Price is rounding out his rotary line with reel models (Roseman units). Toro is wrapping up a deal with an aerifier manufacturer from Australia and has added six new products in as many months. The products are keyed to the way Toro will approach sales to various market segments.

Ransomes has products in England it hasn't yet introduced in the U.S. as well as a busy bunch of engineers in Johnsons Creek, WI. One product being tested is a new concept in aerification, a slitter rather than a corer.

Bunton is clearly after the golf course and park market with Bunton JL. Excel is broadening its selection of engines and choice of attachments for its QuickAttach models. Excel is also readying a line of "light commercial" mowers for its distributors.

Gravely is focusing on full service lawn care companies according to Lee Bouldin, marketing services manager. "The commercial business is the fastest growing segment of this company," says Bouldin. "The commercial mower wants reliable equipment that could do more than one thing." **WT&T**

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JOHN DEERE

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The Hidden Connection

Science and common sense are an unbeatable combination for a successful overseeding program.

by Steve Batten

Winter overseeding has become not only a household word to turfgrass managers across the Southern United States, but to golfers, baseball players, and managers of all types of recreational facilities as well.

Each local area of the United States has developed standard procedures for overseeding that have evolved through the creativity of individual turfgrass managers and research by state universities.

In each part of the country there are misconceptions to winter reappear in discussions with turfgrass managers.

Everyone has heard or observed these. They include the diehard turfgrass manager who uses the same cool season turfgrass cutlivar from year to year.

This is based on the incorrect assumption that all cultivars of perennial ryegrass, as an example, perform the same.

Another misconception is often observed when golf course greens are overseeded with excessive seeding rates or kept at high mowing heights to produce what appears to be attractive putting surfaces.

In reality, these types of playing surfaces place undue burden on the golfer who has to bat the golf ball rather than stroke it to the hole.

Even fall overseeding dates have been misunderstood because they are often based on local tradition instead of natural characteristics of the cool season turfgrass species planted.

Research has shown soil temperature links that play an important role in determining the optimal dates for winter overseeding.

The combination of science and common sense is the hidden connection to a succesful overseeding program.

Common sense

Everyone is trying to find the perfect turfgrass for overseeding, one which establishes quickly and has a smooth unnoticeable spring transition, which, of course, seldom happens.

The chance of outlining the ultimate method of overseeding is just as remote because of the great variance of cultural practices.

However, as the stories of each turfgrass manager are analyzed, similarities continue to appear.

Across the country the preparation of a proper seedbed, as an example, is similar. That is, the bermudagrass is physically or chemically supressed and thinned in density prior to seeding.

One golf course superintendent in

Optimal seeding dates *for rough bluegrass/ryegrass mixture should correspond to the slowest germinating specie. (Photo courtesy of Butch Gill, Northrup King Seed Co.)*

Perennial ryegrass *overseeding for 50 consecutive days at Texas A&M University.*

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Paul Latshaw

Paul Latshaw
Supt. Oakmont Country Club

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Wear simulator being *used to screen wear tolerance. (Photo courtesy of Dr. Jim Beard, Texas A&M)*

Palm Springs, who spent considerable time researching the cultural practices employed in seedbed preparation for overseeding, said each golf course has its own overseeding method. Yet, all had the same goal.

These could be winters with unseasonal sudden cold temperature declines, or even wet winters with a large amount of pest problems such as disease or weed encroachment.

The success of spring transition, particularly in the bermudagrass transitional zones of the Southeastern United States, is directly affected by the condition of the bermudagrass from the previous fall.

If the bermudagrass has a shallow weakened root system in the fall, then its recovery in the spring will be seriously delayed.

Seedbed of the bermudagrass preparation, therefore, has to start in early summer immediately following spring transition of the overseeded grasses.

The first of the summer everyone is searching the market for better grasses, lower prices and outlining the steps towards next fall's seeding dates.

This is the time when entire programs are presented to property owners and green committees.

During this early thought process never overlook the most important consideration or the purpose of overseeding.

Everyone's goal is to have an attractive green playing surface throughout the winter.

However, overseeding can be used to camouflage the encroachment of unsightly foreign bermudagrass selections in areas of the country where bermudagrass does not go dormant.

Overseeded grasses also provide wear stress protection to the underlying bermudagrass. Since most overseeded grasses have greater shade tolerance than bermudagrass, they will also provide a uniform playing surface across a golf course putting green in partial shade.

Also, during early summer, consult with the property owners and green committees to determine the standards the overseeding must accomplish.

On golf course greens, as an example, wear tolerance is a must at golf clubs with large numbers of daily players; 150-200 golfers or more per 18 holes.

The best choice of turfgrass species for these golf courses would be the wear tolerant perennial ryegrasses. Golf clubs wanting fast, low mowed putting surfaces in warm climates could select bentgrass or a mixture with bentgrass as one of its components.

Where both a relatively fast ball roll surface and wear tolerance is the goal, then perennial ryegrass or mixtures and blends with perennial ryegrass can be used.

The golf club has to be made aware that fast ball roll speeds will require constant topdressing and possibly a change in scheduled mowing techniques. This extra care will also require a large enough maintenance budget to accomplish these goals through the winter.

Outlining the seeding program early in the year will mean that there will be no surprises to the supporting facility as far as budget restraints. It also provides an opportunity to apply early common sense logic to your overseeding program.

Selection

Basically, there are four distinct regions across the Southern United States where overseeding bermudagrass occurs.

These are the:

- warm, humid regions along the Gulf coast and far south as Miami,
- the cool, humid regions from Virginia to East Texas,
- cool, arid regions from West Texas to central California, and
- the warm, arid areas of Arizona and Southern California.

The climate difference in each of these regions will vary the requirements for the selection nearest to the ultimate overseeded turfgrass.

In the warm, humid and arid regions, heat tolerance will be essential. Many of the newer perennial ryegrass cultivars possess enough heat tolerance to survive daily winter highs above 80 degrees F even in Miami.

Several perennial ryegrass cultivars such as Birdie, Derby, Pennfine and Prelude, as examples, have experimentally shown good tolerance at two southern universities.

It is no secret that creeping bentgrass has excellent heat tolerance.

For the past 20 years, selections such as Penncross and Seaside have been used in overseeding mixtures as insurance for good early spring performance, when daily air temperatures often become high.

The popularity of overseeding with bentgrass alone is again increasing in some local areas of the United States.

In South Florida from North Palm Beach to 30 miles north, bentgrass is so popular for overseeding that this area has pioneered the use of early and late fall split overseeding dates. This two-date method eases the interruptions of establishment to the late fall and winter golf traffic.

Both the cool humid and cool arid climates have similar seed requirements—early establishment and cold tolerance. Both perennial ryegrass and rough bluegrass possess these characteristics.

Since all bluegrasses have excellent cold tolerance, it is no surprise to consistently observe rough bluegrass cultivars such as Sabre performing well under adverse cold conditions.

Experimentally, rough bluegrass has stood out as an excellent overseeding component in mixtures and alone in monostands since it was pioneered in overseeding research in Virginia in the early 1960s.

Its early establishment makes it ideal for use in the cooler overseeding regions of the country.

Of course, the fastest establishing cool season turfgrass is perennial ryegrass.

During the 1970's, several perennial ryegrass cultivars originating in northern Europe were observed to have excellent cold tolerance.

Two of these that found their way into the U.S. marketplace are still commercially available. They are Loretta and Elka.

At present there is a limited amount of overseeding research at the Southern state universities to determine actual cold and heat tolerance characteristics.

Many of the new perennial ryegrass selections are both heat and cold tolerant, so the gap between cultivars is more narrow.

continued on page 37

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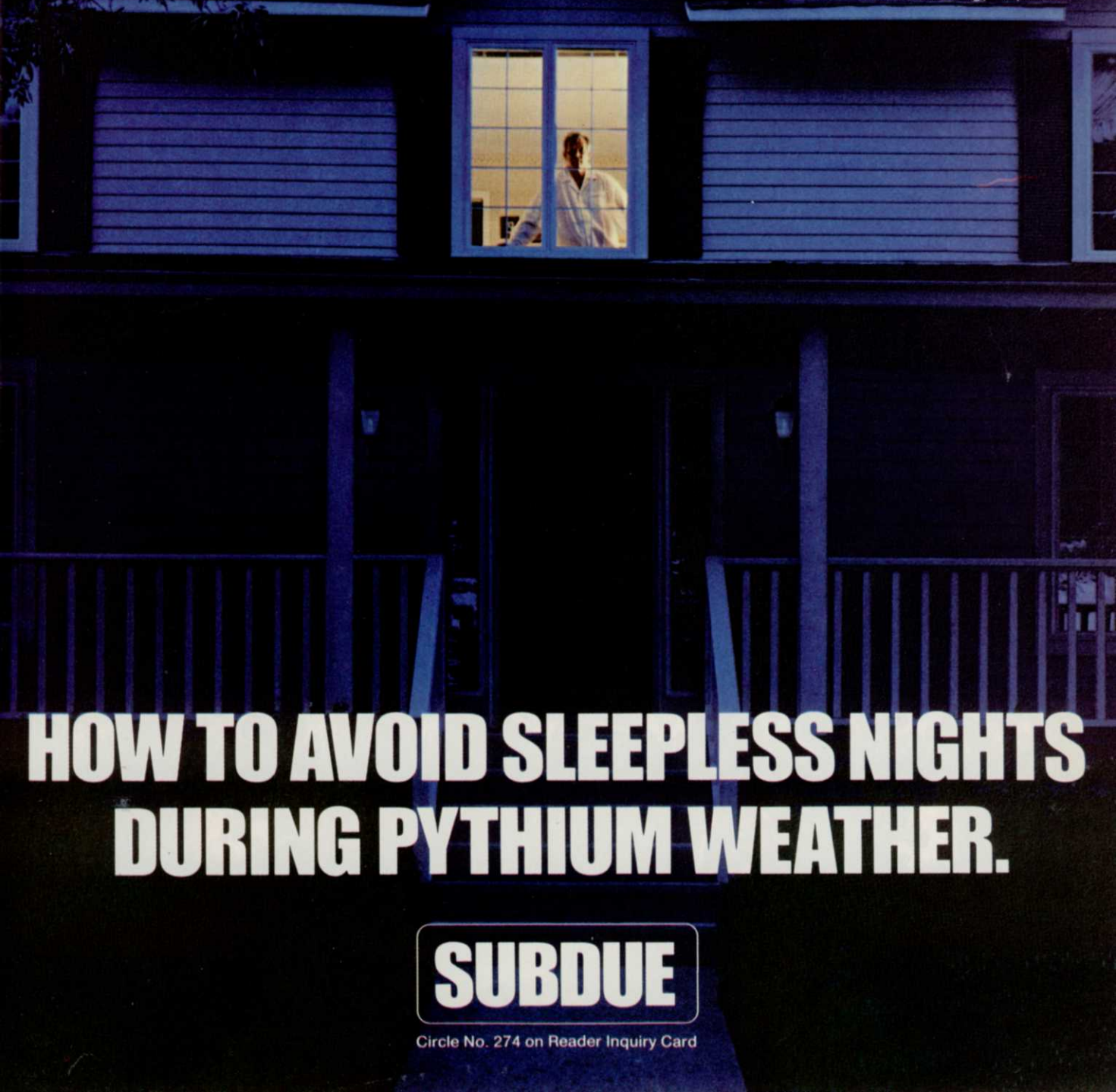

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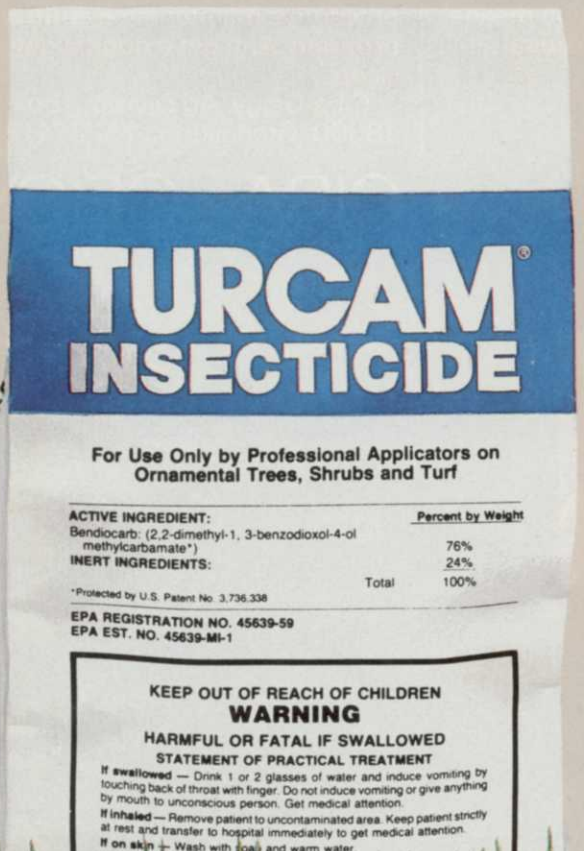

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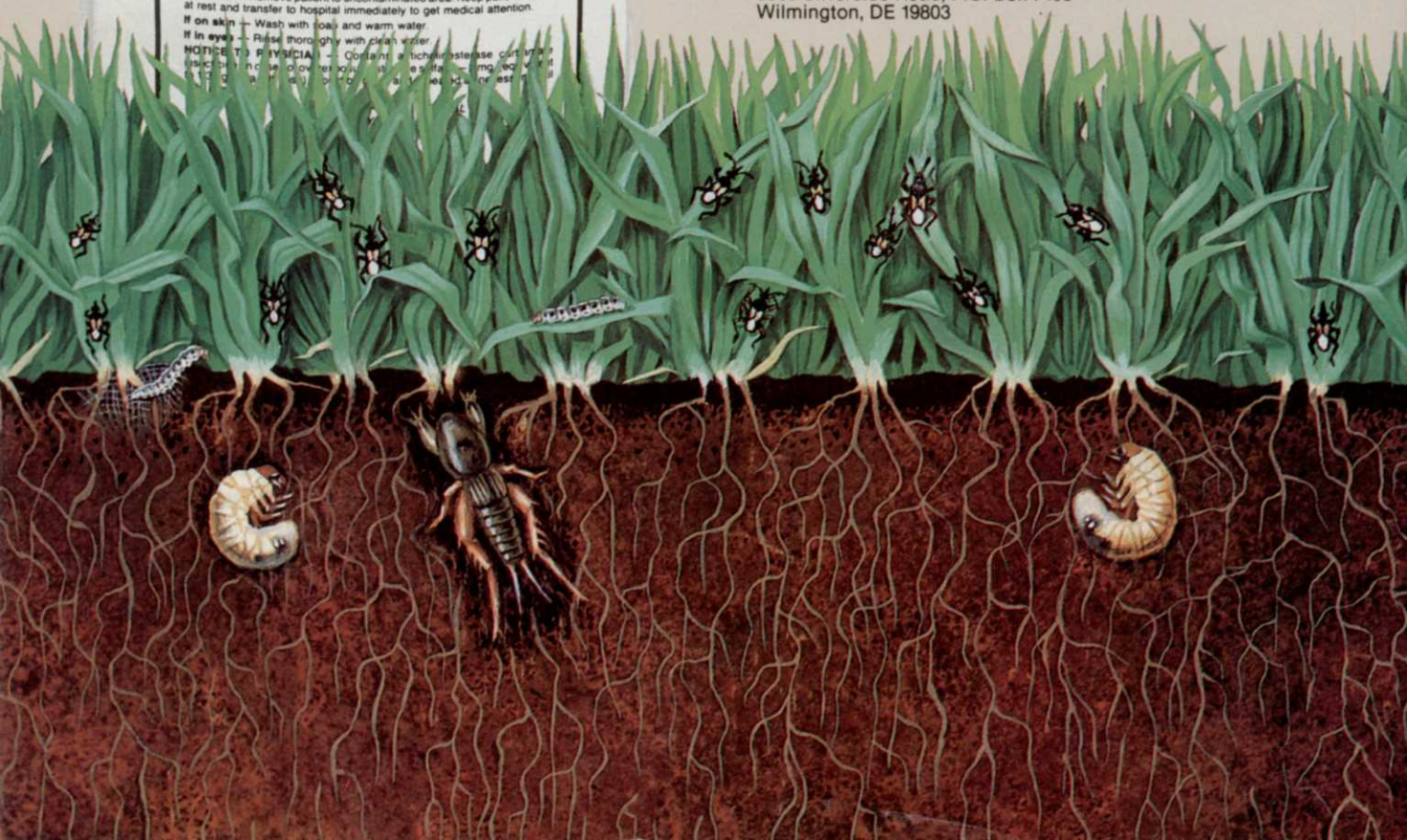

HIDDEN *from page 34*

Just the same, earlier research and consumer demand pioneered the way for the introduction of these new cultivars through turfgrass breeding.

The use of blends of different perennial rye components can combine both heat and cold tolerant characteristics into one commercial commodity.

Wear tolerance

The natural characteristics of wear tolerance and ball roll can affect the selection of the most optimal cool season turfgrass. Cultural management such as seeding rates are factors that influence the performance characteristics of the overseeded grasses.

Ball roll characteristics on a golf course putting green are the results of both the individual cultivar or species, seeding rates and cultural management. Wear tolerance is also affected by seeding rates.

Research in Mississippi and Florida during the mid-60's established suggested seeding rates for annual and perennial ryegrass, rough bluegrass and bentgrass that are much in existence today. These included overseeding rates for ryegrass at a 35-40 pound seed/1,000 sq. ft. range for golf course greens.

These seeding rates are still popular in the southwestern United States where desert heat initiates spring transition.

The southeastern states experienced poor spring transitions resulting from a prolonged shading effect of the bermudagrass and an increase in the natural heat tolerance of the newer available overseeded grasses. This has led to much lower seeding rates of 25-30 pound/1,000 sq. ft. for golf course greens.

Typically, 300-450 pounds of perennial ryegrass seed per acre are rates used for fairways as opposed to 400-700 pound seed/acre for fairways of their western counterparts.

This illustrates where local tradition and experience have played an important role in the acceptance of overseeding techniques.

On several golf courses in south Alabama, seeding rates between 22 to 25 pounds of perennial ryegrass seed/1000 sq. ft. have produced excellent ball roll surfaces that promoted early but smooth spring transitions back to bermudagrass. The key objective here is to realize that too high a seeding rate for golf course greens will create a fast growing, dense vertical shoot mass that creates slow ball roll speeds.

Ball roll speeds

There is also a difference in ball roll speeds between perennial ryegrass cultivars as well as species. It is interesting to note that the difference between ball roll distances of more than eight perennial ryegrass cultivars evaluated at both Texas A&M and the University of Florida in the late 1970's were nearly identical.

Although ball roll characteristics vary among ryegrass cultivars, there is obviously more difference among species.

In mixtures of perennial ryegrass and rough bluegrass for instance, the ball roll speed can be reduced by increasing the percentage of rough bluegrass in the mixture.

Although seeding rates and percentage of mixture components affect golf ball roll characteristics, they could have even more affect on wear tolerance.

At mowing heights of 3/4 inch, a perennial ryegrass seeding rate study was conducted in 1979-81 at Texas A&M University.

One interesting observation of a 3/4 inch mowing height was that too great a seeding rate can actually cause a reduction in wear tolerance.

At the lower putting green mowing heights one could only speculate from field observations that this would not be apparent at typical seeding rates below 40 pounds seed/1,000 sq. ft. At the higher mowing heights such as tees and fairways and at high seeding rates, the perennial ryegrass will not mature and tiller through the winter season, so wear tolerance is reduced through late winter.

Several perennial ryegrass cultivars that have experimentally shown good wear tolerance characteristics in Texas, Florida and even in Europe, are Citation, Delray, Regal and Manhattan.

Often poor results from overseeding can be blamed on cultural practices. The natural characteristics of cool season turfgrasses are part of the formula for successful overseeding.

Overseeding establishment

Philosophies for preparing a seedbed, like overseeding rates, vary. The more modern approach requires the light and frequent vertical mowing of the turf from late summer until the seeding date. This can include light frequent topdressing on greens and tees and even brushing of the fairways with mechanical street sweeping brooms.

Drag mats such as chain link fence or spring tooth harrow to comb the turf prior to seeding are often used. A few turf managers, particularly in warm arid regions, still scalp the bermudagrass and vertical mow just before overseeding.

Chemical suppression with the growth retardant *maleic hydrazide* (or even by applications of Diquat) have been used for large acreage such as golf course fairways. The goal is to suppress the bermudagrass to give the overseeded grass the upper hand.

Research indicates there is a relationship to soil temperature decline and the selection of most optimum overseeding dates.

Beware, however, of retarding the bermudagrass to a point where optimal spring growth is delayed. Nitrogen should be reduced to prevent excessive bermudagrass shoot growth. Conditions in each area are not identical. Turf managers must make common sense judgements concerning their sites.

Fertility practices for overseeding differ also although most managers follow similar patterns using supply starter fertilizers high in phosphorus and potassium. One young superintendent in south Florida pretends his bentgrass is a carpet lying on top of the bermudagrass. His program includes phosphorus and potassium with no nitrogen until the first of January. Color is maintained with micronutrient applications of iron and manganese. Bentgrass has a lower nitrogen requirement than bermudagrass.

Overseeding dates

Research at Texas A&M several years ago is helping managers select the best dates for overseeding. These studies indicate there is a relationship to soil temperature decline and the selection of most optimum overseeding dates.

In the study, four-inch soil temperatures were monitored and perennial ryegrass was overseeded daily for more than 50 days in the fall.

At the Texas College Station site a sudden decline in soil temperatures was observed to occur annually. The

fall soil temperature decline was also observed in cotton research near Dallas and at field research centers in south Georgia and north Florida. This sudden decline can be used to predict the best range of overseeding dates to insure best germination and good seedling vigor.

Typically, dates for overseeding bentgrass should be ahead of overseeding perennial ryegrass. Bentgrass takes longer to establish and its heat tolerance allows for overseeding when optimal bermudagrass shoot growth temperatures are present in early to mid fall. Rough bluegrass, similar to ryegrass, should be overseeded as the fall temperature decline reduces the bermudagrass shoot growth but is high enough for optimal germination. This can be a *narrow* range of dates for the northern transitional bermudagrass areas. Mixtures of different species should always be overseeded at the earliest date that provides optimal results.

Spring transition

Research at both Clemson and Texas A&M fits well with common cultural practices used to initiate spring transition. At Texas it was learned that low mowing and an application of soluble nitrogen fertilizer stimulates a rapid transition of perennial ryegrass. At Clemson chemical suppression with low application rates of melfluidide retarded the shoot growth of overseeded ryegrass enough to help initiate spring growth of bermudagrass.

The difference in growth retardant tolerance between the two grasses is great enough to create this chemical induced transition. Vertical mowing at frequent intervals recessed the bermudagrass more than at less frequent weekly intervals and caused a delay in transition. These studies indicate spring transition can be predicted. The greater heat tolerance of many of the new perennial ryegrasses may no longer present a problem with spring transition.

Cultural practices such as vertical mowing, low mowing heights, and application of soluble nitrogen fertilizers are now common for forcing spring transition on golf courses.

Transition naturally occurs when spring soil and air temperatures above 80 degrees F. cause the ryegrass roots to decline in active growth. If soluable nitrogen fertilizer is applied then the shoot growth of the ryegrass is further stimulated, but not the root growth. This causes an imbalance in the grass plant.

Combine this with low vertical mowing and the rate of transition accelerates.

Heading where?

In the past 20 years turfgrass research has opened doors, leading to our present techniques for winter overseeding and a large number of improved cool season turfgrasses. (From 1977 to 1980 over 120 different turfgrasses among five species were evaluated at Texas A&M alone.) Common cultural practices came under scrutiny and more uniform and trustworthy methods blended with and improved local techniques. The use of triplex greens mowers with vertical mower reels aided the revolution.

The research continues.

There is an ever increasing number of commercially available perennial ryegrass cultivars and a national overseeding test coordinated through the USDA in Beltsville, MD. This is encouraging for the common sense utilization of the scientific aspects of winter overseeding. **WT&T**

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Circle No. 147 on Reader Inquiry Card

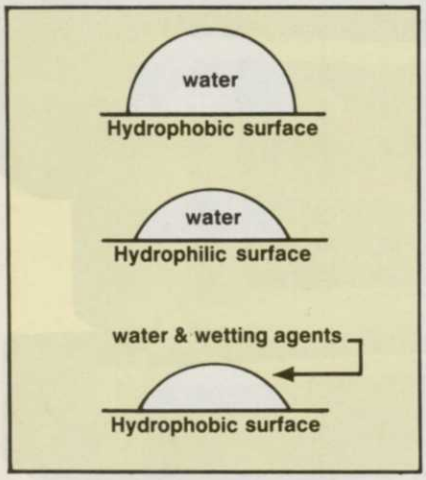
Wetting Agents

by **Dr. A. Martin Petrovic**, Cornell University

The field of turfgrass management has seen a myriad of products come and go. One class of products called wetting agents has received a lot of attention and caused some controversy from time to time.

Wetting agents, sometimes called surfactants or surface active agents, have been developed mainly to change the physical properties of water.

They act by reducing the surface tension of water, which makes it possible to wet the surface of solid objects such as soil particles or thatch. Surface tension is the tendency of water to form a droplet, as shown below, when placed on a surface.



If the surface is hydrophobic (water repellent), there is a large contact angle formed between the water and the surface; a drop forms. If a drop of water is placed on a hydrophilic (water loving) surface, such as a sponge, a small contact angle develops; wetting occurs.

If a wetting agent is added to the water on the hydrophobic surface, there is a small contact angle formed, due to a lower surface tension, and wetting occurs. Wetting agents are generally classified based on their chemistry: anionic, cationic and nonionic.

Anionic surfactants (negatively charged) are seldom used on turfgrass because they are somewhat more phytotoxic than the other forms and are suspect to leaching as are any anions like nitrates.

The effects of wetting agents *on improving the quality of an area with localized dry spots is dramatic. Note the darker, healthier areas treated with wetting agents.*

On the other hand, cationic wetting agents (positively charged) act much like cations in the soil and are tightly held to the soil which makes them less effective.

Nonionic wetting agents have no charge and appear to be less phytotoxic than the other classes. Nonionic wetting agents come in the form of esters, ethers and alcohols.

Combinations of one or more of these forms provides for more effective wetting over a wide range of soil types. Table 1 contains a list of some of the wetting agents used in turf.

Current uses for wetting agents

Wetting agents have been reported to or claimed to be useful in the following ways:

1 Improving the wetting of localized dry spots, such as hydrophobic soils and/or thatch
2 Affecting plant growth
3 Improving water movement into soil
4 Improving drainage
5 Reducing compaction
6 Helping to reduce the development of thatch
7 Removing frost and dew
8 Increasing fertilizer and pesticide effectiveness
9 Aiding water efficiency, thus reducing irrigation costs

What is known that can support some of these concepts?

Improving localized dryness

The name wetting agent implies that their major purpose is to aid in the wetting of substances.

There has been considerable research done at both Michigan State University and Ohio State University on the causes and cures of localized dry spots, LDS.

Table 1.
A list of common wetting agents used in turfgrass management

Trade Name	Manufacturer	Rate of Application (oz/1000 ft²)
Aqua Gro	Aquatrols Corp. of America	4 to 16
Hydro Wet	Kalo Laboratories	8 to 16
Lesco Wet	Lesco Corp.	8 to 16
Peneturf*	Four Star Agr. Serv.	0.2
Surf Side	Montco Prod. Corp.	16 to 32

* Marketed as a soil conditioner.

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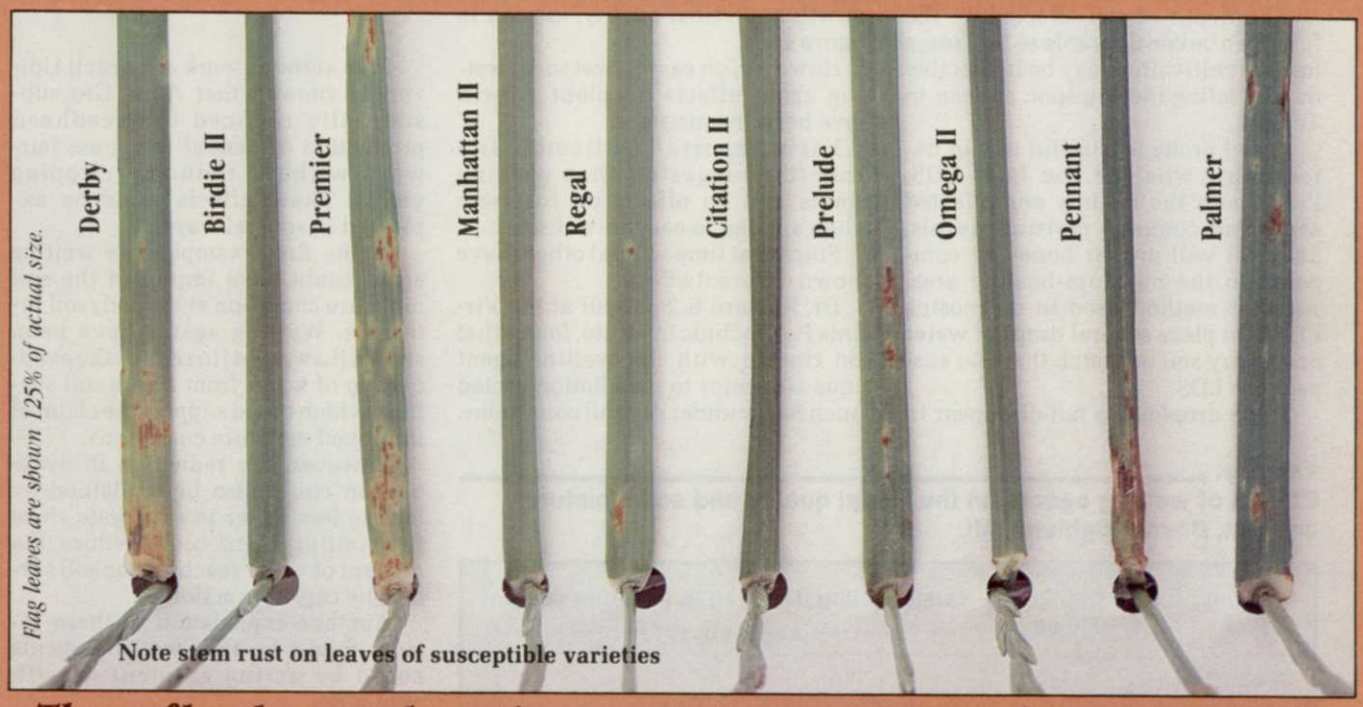

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The problem of LDS has been primarily on golf courses but it is becoming more clear that they are a problem on most turfgrass sites.

The problem of LDS is caused by a fungal growth that produces a wax-like material that coats the particles of soil or thatch. When wetting agents are applied to LDS, the soil moisture conditions are improved, resulting in better quality turf (see Table 2).

The depth of soil affected by the fungi can be considerable so that some form of cultivation may be ineffective in alleviating the dry spot, as seen in Table 3.

A soil probe is a useful tool in determining whether you have LDS. Probe both the healthy and affected areas and compare moisture levels. LDS soil will appear bone dry compared to the moisture-healthy area. Another method used in diagnosing LDS is to place several drops of water on the dry soil or thatch that you suspect has LDS.

If the droplets do not disappear in 10 minutes there is a good chance that the area has LDS. Remember that uneven irrigation delivery, heavily sloped sites and shallow soil underlined by debris or rocks can appear to have LDS.

Growth, quality

On areas that contain LDS, treatments with wetting agents can result in a dramatic improvement in plant growth and visual quality, as seen in Figure 1.

However, on easy to wet soils, wetting agent effects on plant growth have been inconsistant.

Early reports (Whitcomb and Roberts) suggested that wetting agents had no effects on turfgrass when applied to easy-to-wet soils.

Since that time several others have shown different effects.

Dr. Richard E. Schmidt at the Virginia Polytechnic Institute, found that sod treated with the wetting agent Aqua Gro prior to installation rooted much faster under dry soil conditions.

TABLE 2.

Effects of wetting agents on the visual quality and soil moisture content, Boyne Highland, MI.

Wetting Agent	Rate† Oz/1000 sq. ft.	Quality rating (I=ideal) August 4, 1977	% Moisture content August 4, 1977
Check	-	6.1	12
Aqua Gro	8 + 8	3.8	16
	16	2.2	20
	16 + 16	3.8	16
	32	2.4	19
	8 monthly	2.5	18
Hydro Wet	16	2.5	17
	16 + 16	2.3	17
	8 monthly	1.6	23

* Data courtesy of Dr. Paul E. Rieke and Mr. R. Bay, Michigan State University.
† Treatments started June 9, 1977.

TABLE 3.

The effects of wetting agents and cultivation on the visual quality, 18th Fairway, Boyne Highland, MI*

Cultivation	Visual Quality Rating (1=ideal), Oct. 26, 1973: Check	Aqua Gro (16 oz/1000 ft²)
None	6.7	4.0
Spiker	5.3	3.2
Core cultivator, 1/2" tine	4.0	2.2
Core cultivator, 5/8" tine	5.0	2.3

* Data courtesy of Drs. Paul Rieke and James Beard, Michigan State University

On areas that have localized dry spots, wetting agents can result in a dramatic improvement."

This author's work at Cornell University showed that Aqua Gro substantially reduced the seedhead production of annual bluegrass fairways without reducing clipping yields. These effects could be explained in several ways.

In the first example, the wetting agent could have improved the soil moisture condition at the sod/soil interface. Wetting agents have been shown (Law, 1964) to reduce the evaporation of water from a bare soil surface, which could support the claim of improved moisture conditions.

However, the reduction in evaporation could also be explained by having less water to evaporate since the wetting agent could reduce the amount of water reaching the soil surface by capillary action.

Another explanation of these results might be that wetting agents could be acting as plant growth regulators.

Seedhead suppression and increased rooting are two effects of plant growth regulators.

Classes of regulators

Two classes of plant growth regulators are phenolics, like 2,4-D, and ethylene compounds.

Aqua Gro contains both phenolic and ethylene compounds and it is very likely it is acting like a plant growth regulator.

Improvement of water movement into soil by wetting agents has been shown primarily on LDS areas; however, on easy to wet soils there is little evidence to suggest any improvement.

Drainage can be improved by wetting agents, especially in layer soil profiles. Wetting agent manufacturers claim that compaction is reduced by wetting agents.

Research has not been done to substantiate this claim. However, if water is drained more rapidly following rainfall or irrigation, the soil will be less likely to be compacted, which can be important on sites that receive heavy, uncontrolled traffic.

Adding a wetting agent to an exist-

continued on page 84

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Circle No. 124 on Reader Inquiry Card

Getting Back to Basics

Knowing how much water to apply and when are key questions in developing an efficient irrigation program.

by Dr. Robert N. Carrow

Water is necessary for a turfgrass plant to grow and be physiologically healthy.

In fact, most of the cells of a turfgrass plant contain 80 to 90 percent water on a weight basis. Unfortunately, weather patterns often do not result in sufficient water for good growth and the grower must irrigate.

The grower who desires to conserve water and irrigate efficiently is confronted with two questions:

- When should I irrigate? (i.e. frequency of irrigation)
- When I irrigate, how much water should I apply? (i.e. rate of water application)

The answers to these questions cannot be given in one or two easy "rules of thumb".

Instead, the grower must have at least a basic knowledge of the important factors that influence plant water relations—then a good irrigation plan can be developed based on sound principles.

The wise turfgrass grower should think about how to maximize inputs, minimize outputs and maintain as large a reserve pool as possible.

Thus, before we deal with the two questions of frequency and rate, we shall look at the soil-plant-atmospheric system from a budget approach.

Water management can be visualized as a bank checking account (Figure 1) with additions (inputs), losses (outputs), and a reserve balance at any point.

The wise turfgrass grower should think about how to maximize inputs, minimize outputs, and maintain as large a reserve pool as possible.

The maximum reserve pool of plant-available moisture depends primarily on soil texture and extent of the plant's root system. Thus, unlike a checking account which can hold unlimited funds, the "reserve water account" has a maximum limit determined by soil and plant factors.

Table 1 illustrates how soil texture influences plant-available moisture, which is the fraction of total water held in the soil that the plant can potentially extract. Some water is unavailable for plant uptake because it is held so tightly by adhesion and cohesion forces in the soil.

Sometimes a turf manager may increase the plant-available moisture fraction by adding organic water which holds much water to a sandy soil. The turf manager can greatly expand the maximum reserve pool of water by using cultural practices favoring maximum root development.

A plant with a 12-inch root system has twice as much water available to it compared to one with a 6-inch root system. This illustrates why our research-teaching-extension personnel stress management for a good root system.

Major factors that limit rooting are: close mowing; excessive nitrogen, irrigating lightly and frequently, compacted soils, and root feeding insects.

Inputs of moisture are precipitation, overhead irrigation, dew, and in some situations, capillary rise of moisture from below the root system.

Since precipitation and irrigation are the major inputs, we will only discuss these in this article. The grower cannot control the rate or frequency of precipitation but he or she has complete control of irrigation inputs.

continued on page 48

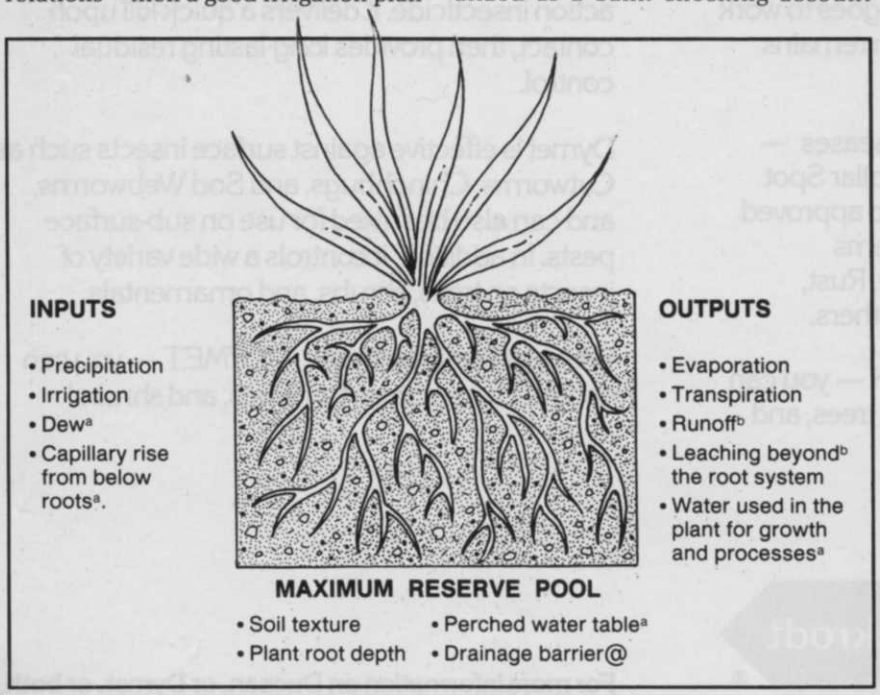

Figure 1. *Budget concept of turfgrass water mangement ([a]denotes minor factor in most situations; [b]These should be minor if corrected by the turf manager). After: Carrow, R. N. 1985. Turfgrass soil-water relationships. In V. A. Gibeault (Ed.). Turfgrass Water Conservation. ANR Pub., Univ. of Cal., Oakland, CA.*

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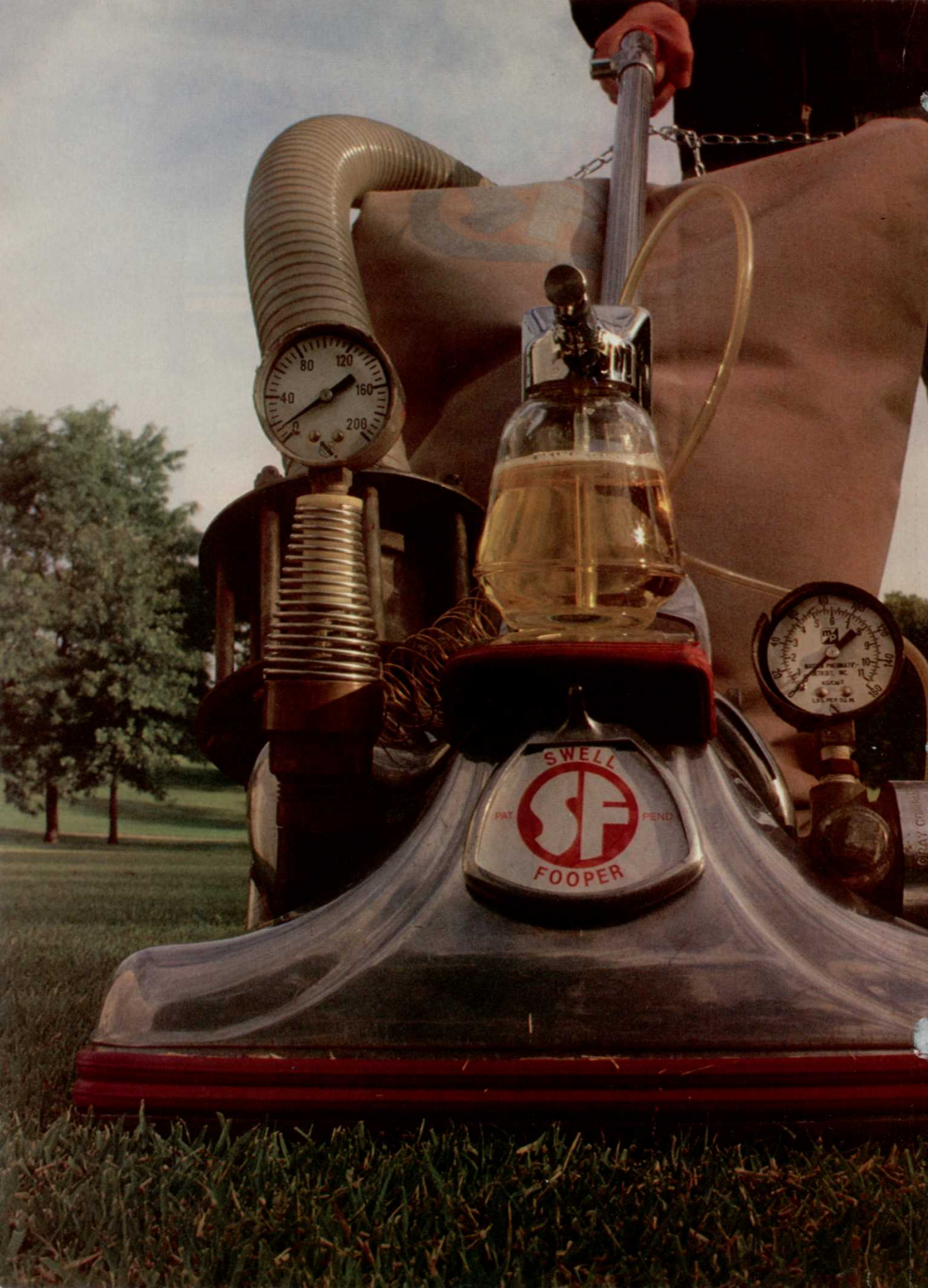
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TABLE 1.
Total water, plant available water, and plant unavailable water typically held by different soil texture classes.

Soil Texture	Water-holding capacity (inches per foot of soil) Total	Available[a]	Unavailable[b]
Sand	0.6-1.8	0.4-1.0	0.2-0.8
Sandy loam	1.8-2.7	0.9-1.3	0.9-1.4
Loam	2.7-4.0	1.3-2.0	1.4-2.0
Silt loam	4.0-4.7	2.0-2.3	2.0-2.4
Clay loam	4.2-4.9	1.8-2.1	2.4-2.7
Clay	4.5-4.9	1.8-1.9	2.7-3.0

[a]Available for plant uptake
[b]Not available for plant uptake
From: see reference, Figure 1.

Keeping tabs

Accurate rainfall and snowfall records should be kept so that the irrigation program can be adjusted for precipitation.

Also, the irrigator must know how much water his system applies per unit of time (i.e. inches of water per hour). Losses of water or outputs include runoff, leaching beyond the rootzone, evaporation from moist soil and plant surfaces, and transpiration which is water vapor lost from the plant leaves through the stomates.

Runoff can be reduced or eliminated by cultivating (coring, slicing) sloped areas, dethatching if needed, and applying water at slower rates on sloped areas.

Over-watering causes water to move beyond the root system and become unavailable for plant uptake. Leaching losses can be reduced by monitoring the depth of turfgrass root growth and then irrigating with sufficient moisture to wet the soil to just below the root system; one or two inches below the roots.

This can be observed by looking at the depth of water penetration a few hours after irrigation relative to the rooting depth.

Assuming that the turf manager has corrected runoff and leaching losses, the remaining losses of water are evaporation and transpiration. These are often combined into the term evapotranspiration (ET).

It is the ET losses of water from the soil and plant that must be replenished by precipitation or irrigation if turf growth is to be sustained. Most of the water taken in by a plant's roots is used in the transpiration (90 percent or more) process. The remainder of the water taken up by a plant is used for cell growth and physiological processes.

Transpiration, the vaporization of water from inside the plant leaves through the open stomata, removes heat from the plant and is important for prevention of high temperature stresses.

The evaporation component of ET should be minimized but cannot be totally eliminated. Water lost by evaporation from moist soil and plant surfaces cannot be used for the beneficial processes of transpiration or growth.

Immediately after irrigation the evaporation component will be high but will decrease rapidly as the soil and plant surfaces dry. Thus, avoiding light, frequent irrigation will reduce evaporative losses.

Also, maintaining a dense, higher cut (within the recommended cutting height ranges) will shade the soil surface and reduce evaporation.

Since evaporation and transpiration are both vaporization processes, the grower can visualize how climatic conditions influence ET. Weather conditions that increase ET are:

- low humidity
- high temperatures
- clear and bright days
- high winds

However, if ET exceeds the ability of a plant to absorb enough soil moisture, the plant's stomata will close which greatly reduces transpiration as well as transpirational cooling.

Greatest efficiency

From this brief discussion of the soil-plant-atmospheric system as a water budget, the grower is encouraged to start thinking of how to control different parts of the system to efficiently irrigate.

No one factor alone will result in maximum water use, but by adjusting several factors the grower can irrigate better and have a good quality turfgrass.

Frequency of irrigation depends on many factors:

A rate of ET
B turfgrass species, and
C management-mowing, fertilization
D irrigation, traffic level, etc.

This is why it is impossible to give absolute frequencies of irrigation to a grower. Frequency of irrigation changes dramatically with time of year even if you are dealing with only one species and one management regime.

ET rates for turfgrasses are commonly in the 0.10 to 0.25 inches of water per day but may be as much as 0.45 inches of water per day for a well-watered turf exposed to high ET conditions.

If a grower has a turf with a 12-inch root system, a loam soil, and an average ET rate of 0.25 inches per day, then from Table 1, we can see that

TABLE 2.
Relative need for frequency of irrigation under home lawn conditions.

Species[a]	Frequency of Irrigation
COOL SEASON	
Tall fescue	Least frequent
Red/chewings fescues[b]	
Perennial ryegrass, improved	
Kentucky bluegrass, common	
Kentucky bluegrass, improved	
Creeping bentgrass	Most
Rough bluegrass	
WARM SEASON	
Buffalograss	Least frequent
Bermudagrass	
Bahiagrass	
Zoysiagrass	
St. Augustine	
Centipede	
Carpetgrass	Most

[a] Cultivars within a species vary; thus some cultivars may rank better than the species as a whole.
[b] Red/chewings fescues may go easily dormant if irrigated too infrequently.

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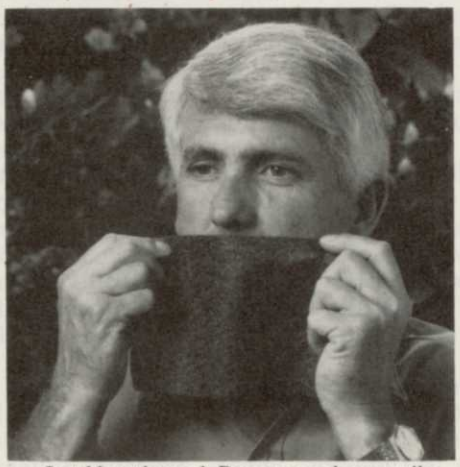

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irrigation would be needed every four days (1.3/0.25) to eight days (2.0/0.25).

If the soil was a sand, irrigation frequency would be every 1.5 to four days. Turfgrass species and cultivars of a species vary greatly in water use because they differ in leaf area, shoot density, rooting depth, growth rate, and other aspects that influence water use.

Table 2 gives a general ranking of turfgrasses as to their frequency of irrigation, assuming each has a fully developed root system.

In a home lawn situation with a good cultural regime for the particular species management practices have a profound influence on how often irrigation is needed because they affect the growth and development of the plant.

A few examples will illustrate this principle:

A *Mowing Height* — mowing too close for the species will result in a much reduced root system and an open turf. The reduced rooting decreases the "maximum reserve pool of water" while the open turf results in higher evaporation versus transpiration losses.

B *Excessive Nitrogen* — applying nitrogen beyond the plant's needs will cause a decline in rooting and promote excessive leaf growth - more leaves for transpirational losses. This results in transpirational water use beyond the real needs of the plant.

C *Irrigation* — if a grower irrigates more frequently and at a lower rate i.e. more lightly than necessary, the turfgrass plant does not develop its full potential for rooting depth.

D *Traffic* — recreational turf is subjected to wear on the above-ground plant parts and to soil compaction. Wear of the turfgrass shoots causes the grower to force a faster growth rate with more nitrogen and water. Also, recreational turfs are often mowed closer because of their use.

As previously discussed, these all increase water use. Soil compaction reduces rooting and thins out the turf so that more frequent irrigation is often applied. Also, reduced infiltration under compaction encourages the irrigator to go to a more frequent, light application schedule. The grower should experiment with different irrigation frequencies with the goal of irrigating as infrequently and as deeply (i.e. with a higher water quantity) as possible.

This necessitates knowledge of the plant's rooting depth which changes on a seasonal basis and depth of water penetration after irrigation. On most sites, there are indicator spots that first exhibit wilting - as evidenced by a bluish-green color; footprinting; or rolling, folding, drooping of leaves.

By observing these, a grower can obtain some guidance as to when to irrigate his site.

Rate of application

It should be obvious by this point that the turf manager must know his soil texture, depth of plant root development, and how much water his system applies per unit of time.

For example, if the soil is a loam (Table 1), which the grower believes has an available water-holding capacity of 2.0 inches per foot of soil, and a turf with a 12-inch root system, he should apply 2.0 inches of irrigation when his plant starts to show wilt symptoms.

If by observing the soil a few hours after irrigation, he finds that water penetrated to 16 inches, then the rate of water should be adjusted to a lower one; perhaps 1.50 inches the next time.

By a little experience based on observation, the irrigator can determine the actual quantity needed for his specific soil. After a turf manager determines the quantity of water needed to replenish that lost by ET, he must know how long to run his irrigation system to apply this quantity. In the above example, let us assume that 1.5 inches of water is enough and that the irrigation system applies 0.5 inches of water per hour. Thus, the system must run three hours (1.5/0.5) to obtain the total amount needed.

This quantity of water can be applied in different ways. If the soil has a good infiltration rate, above 0.50 inches per hour in this case, the water could be applied in a single three-hour setting. If the soil has a lower infiltration rate, the grower may wish to improve infiltration by cultivation or removal of excessive thatch.

On low infiltration soils, an automatic system can be programmed to apply water onto a site in two or three sequences separated by a few hours or even one day if necessary.

The first application in the sequence can be longer since soil takes water faster when it is dry; especially, if it cracks upon drying.

Of all the management practices that a turfgrass grower must do to develop a good turfgrass, irrigation is the most important. Yet, it is the most complex since a knowledge of each component of the soil-plant-atmospheric system is required.

The turf manager must truly think in terms of managing the whole "system" in order to achieve efficient water use.

Dr. Carrow is associate professor in the Department of Agronomy, University of Georgia.

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A Living Legend

What history has wrought, modern turf practices and know-how keep alive and green on the tranquil grounds of Spring Grove.

by Maureen Hrehocik, managing editor

Nestled against Cincinnati's industrial Millcreek Valley is an enclave of art, architecture, geneology, botanic-like gardens and history.

Sixteen Ohio state champion trees are scattered over the 733 acres of rolling hills where joggers, walkers and birdwatchers flock to indulge in their favorite pasttime.

Thirteen lakes meander through the property so rich in history it's listed on the National Register of Historic Places. In the spring 25,000 tulips and 10,000 pansies paint splashes of color on the landscape; in the summer 30,000 bedding and foliage plants continue the breathtaking color; in fall they are replaced with 4,000 mums.

The cemetery's gently sloping terrain has changed little in the past 140 years.

Spring Grove could easily be an arboretum. Instead it is a cemetery; the final resting place of more than 183,000 people.

It is a Garden of Eden-like retreat.

Spring Grove Cemetery is the largest non-profit cemetery in the country and has been called *the* prototype rural cemetery. The "lawn plan" cemetery which originated here in the mid-19th century was considered radical at first. Later it was accepted almost universally as a model plan.

Visionary beginnings

Spring Grove was chartered in 1845. Its designer, Adolph Strauch, studied

An arboretum-like *setting brings many visitors to Spring Grove.*

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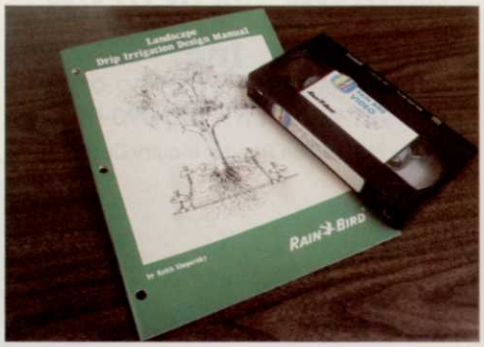

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Circle No. 138 on Reader Inquiry Card

Tom Smith, front, *Jack McAfee and Leonard Thomas.*

A 375-year-old white oak is the oldest tree in the cemetery.

under Frederick Law Olmsted of Central Park fame. It was Strauch's vision that saw the need for the preservation of the park-like piece of land. Roads did not disturb the natural contours, but instead were made to follow them.

The Prussian-born landscape gardener and superintendent of the cemetery encouraged lot owners to authorize removal of fences and hedges from around graves. Concerned with protecting the wooded areas of native trees, he also planted hundreds of varieties of plant materials from all over the world.

Imported and native birds were provided sanctuary beside the lakes and in the protected woodland area. The cemetery's gently sloping terrain has changed little in the past 140 years.

Privately commissioned memorials, works of art in their own right and many done by local artists, dot the cemetery grounds. Private mausoleums, dominated by the more than 100-year-old gothic Dexter mausoleum with balustrade and flying buttresses create imposing reminders of the cemetery's history. The Burnet Mausoleum, built in 1865 of Italian marble in the Corinthian style, contains the remains of Judge Jacob Burnet, author of the first state constitution, and his family.

Spring Grove is an obvious source of pride in the community. As many as 6,000 people will flood the cemetery on Memorial Day. More than 50,000 people tour it in an average year.

"The people who work here are committed to excellence in everything they do."—Smith

Educational resource

The cemetery is as much a learning resource as it is an aesthetic experience.

Groups from the University of Illinois, University of Cincinnati, Purdue, Kentucky University, Miami of Ohio and Ohio State come to study plant material, design and maintenance.

What history has wrought at Spring Grove, modern technology and landscape management practices keep, literally, alive and green. Vice president Tom Smith's 85-person grounds crew is well aware of the legacy they are entrusted with.

"The people who work here are committed to excellence in everything they do," says Smith. "We've set high goals. We're also committed to the community and in sharing what we have as far as a greenbelt resource for the community."

The cemetery sponsored a pruning clinic attended by more than 200 Cincinnatians. A deciduous forest is used frequently as a picnic spot for the Boy Scouts. A few acres are also set aside for community vegetable gardens.

"We're more than willing to share our bounty," continues Smith.

Spring Grove is full of bounty.

Of its 733 acres, 330 acres are woodlands and only 40 miles of roads snake their way through the preserve. The gravesite encroachment rate is only 20 acres every 10 years. Ninety percent of the cemetery's volume is contained in the front 150 acres. Revenue from trees harvested in the undeveloped woodland area is used to buy more nursery stock.

There are anywhere from 1,200 to 1,500 interments a year (including cremations). That averages to about five new graves a day.

"Land is our most important and vital resource," confirms Smith.

Give-and-take

People are also at the top of the list.

Spring Grove has an employee association. It has no national union sanctions but provides the same type forum for employees to voice concerns. Job openings that become available are put up for bid. Mimimum pay for all contract positions is $7.38 an hour.

Smith is pleased with the whole structure of management's rela-

tionship with the employees' association.

"Right now we're trying to hold the line on hiring," says Smith. "We have a tight nucleus of highly motivated, highly trained people."

Because of this, there is a certain prestige about working at Spring Grove. There is also a very low turnover rate.

"We've had great success with seasonal labor, but the employee association dictates how many temporaries we can use."

Workers plant hundreds *of ivy plants in one of the many cemetery gardens.*

Spring Grove is home to one of the largest collections of American holly in the country.

For those in supervisory positions, a consulting group was brought in to present a program on "eliminating communication barriers."

Safety is also a top priority at Spring Grove. Those assigned to spraying pesticides are given a blood test every month to make sure sprays and pesticides are being handled properly. All supervisory personnel know CPR. Of its 85 peak-season employees, 50 are seasonal, 25 are employed year-round and the rest are students.

Smith, who holds a bachelors degree in botany and a master's from Yale in forestry, is the vice president of operations and in charge of landscape maintenance and administering an operating budget that approaches $3 million. The maintenance budget is bolstered by trust funds that have been specifically earmarked for maintenance.

"The rest comes (of our income) from sales, service and investments," explains Smith. "Our long range goal is to have the maintenance covered exclusively by investments."

Leonard Thomas supervises horticulture and Jack McAfee is general foreman of maintenance of the grounds. Under Thomas and McAfee are 10 foremen who handle 10 crews.

"Our maintenance schedule and procedures are very integrated," explains Thomas. "Immediately following mowing is trimming and following trimming is clean-up. It's all very orchestrated and planned."

The turf at Spring Grove is a blend of newer fine-leafed fescues (including FineLawn, Rebel and Falcon). Overseeding in bluegrass areas is done with Pennfine, Regal and Manhattan perennial ryes.

It takes McAfee's 10-person "Yazoo crew" seven days to make one entire round mowing the cemetery grounds. His six-person trimming crew then does the trim work followed by a six-person crew with weed eaters.

Thomas says growth regulators and chemicals for the most part are used sparingly. "We use growth regulators on slopes because of inaccessibility," he says. "Embark, and especially Cutless, because it can be used on ornamentals as well as turf, have worked well for us. Limit also looks like a real good prospect for us. It's non-discoloring and enhances root formation."

Tree-topping, stump grinding and road sweeping are the only jobs contracted out. Chips from felled trees and from stumps are used for mulch around trees.

"It creates a good buffer between trees and machines," says McAfee.

Thomas and McAfee are confronted with few disease problems. Sometimes grave-digging disturbs roots and allows diseases to enter. Insects such as tent caterpillars are seasonally bothersome. Methoxychlor takes care of elm bark beetles.

It takes a crew of 10 two months to clean the 18,000 ivy and euonymus graves in the cemetery. Thirty percent of the maintenance budget goes into maintaining and propagating groundcover graves.

"We're currently involved in a grave marker lowering program to reduce maintenance," says McAfee. "I'd say 95 percent of the lot owners are happy we're doing it." The large monuments, however, will always be a part of Spring Grove.

Unique species

Thomas is in charge of the landscape horticulture department which includes a four-person tree crew, 10 on the landscaping and greenhouse crew, six who care for groundcover and eight for turf. He also has a full-time florist who has been at Spring Grove for 30 years.

The horticulture department has a 2 ½-acre nursery with a 2,500-plant inventory, four greenhouses where all flowers are propagated except bulbs. His department is also responsible for the interior plants in the administration and surrounding buildings.

Spring Grove has the largest *Eucommia ulmoides*, Hardy Rubber, and the largest species of *Zelkova serrata*, Japanese Zelkova, in the country. It's also home to one of the largest collections of American holly in the country. A 375-year-old white oak is the oldest tree on the property.

"We work closely with the National Arboretum and other arboreta across the country," says Thomas.

Spring Grove is situated on the edge of an aquifer. Smith says water is pulled from 85 to 180-foot deep wells and pumped into a cistern. From there it goes into a holding tank. The water is literally dropped to get pressure for the irrigation system.

The future

Future plans call for an on-premise flower shop and a visitor center. But Spring Grove's main goal continues to be the one set down by its founders over a century ago, says Smith.

"We are committed to perpetuating the reputation that has gone on before us. We are progressive traditionalists. We're not afraid of doing things differently. We like the challenge of change." **WT&T**

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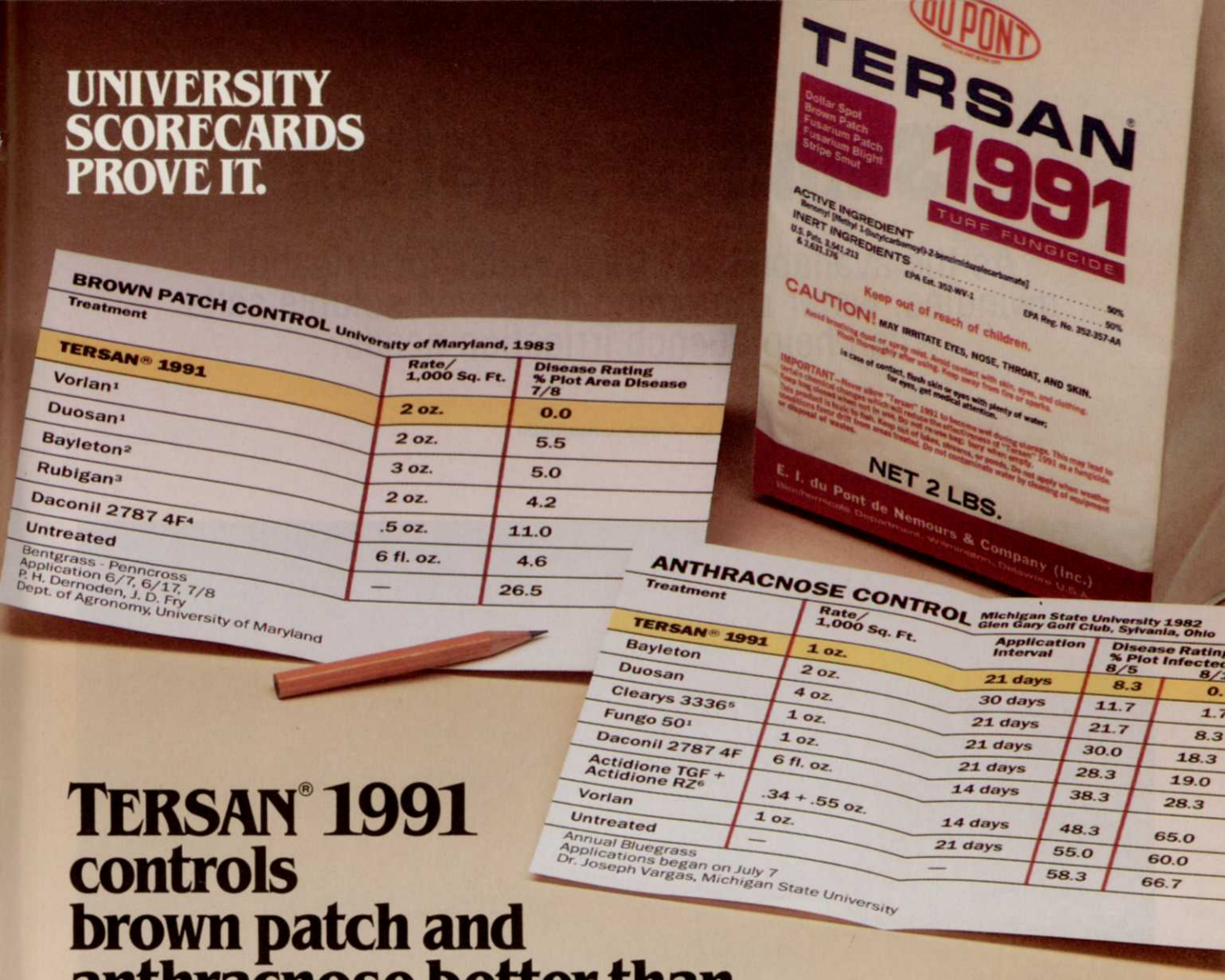

BROWN PATCH CONTROL University of Maryland, 1983

Treatment	Rate/ 1,000 Sq. Ft.	Disease Rating % Plot Area Disease 7/8
TERSAN® 1991	2 oz.	0.0
Vorlan[1]	2 oz.	5.5
Duosan[1]	3 oz.	5.0
Bayleton[2]	2 oz.	4.2
Rubigan[3]	.5 oz.	11.0
Daconil 2787 4F[4]	6 fl. oz.	4.6
Untreated	—	26.5

Bentgrass - Penncross
Application 6/7, 6/17, 7/8
P. H. Dernoden, J. D. Fry
Dept. of Agronomy, University of Maryland

ANTHRACNOSE CONTROL Michigan State University 1982
Glen Gary Golf Club, Sylvania, Ohio

Treatment	Rate/ 1,000 Sq. Ft.	Application Interval	Disease Rating % Plot Infected 8/5	8/
TERSAN® 1991	1 oz.	21 days	8.3	0.
Bayleton	2 oz.	30 days	11.7	1.7
Duosan	4 oz.	21 days	21.7	8.3
Clearys 3336[5]	1 oz.	21 days	30.0	18.3
Fungo 50[1]	1 oz.	21 days	28.3	19.0
Daconil 2787 4F	6 fl. oz.	14 days	38.3	28.3
Actidione TGF + Actidione RZ[6]	.34 + .55 oz.	14 days	48.3	65.0
Vorlan	1 oz.	21 days	55.0	60.0
Untreated	—	—	58.3	66.7

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Applications began on July 7
Dr. Joseph Vargas, Michigan State University

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Circle No. 111 on Reader Inquiry Card

Saline Irrigation

As the availability of fresh water for irrigation dwindles, water containing dissolved soluble salts can help quench irrigation needs.

Dr. Bruce J. Augustin

Alden Pines Country Club *near Ft. Meyers, FL, is an example of how turfgrass managers are coping with saline environments. The course is located on the Gulf of Mexico. Its irrigation water has an EC reading of 10 dS/m. The entire facility is planted with Adalayd Seashore paspalumgrass.*

Irrigation is becoming a major cultural practice throughout the United States for turf and ornamental plants.

Providing adequate supplemental water insures a consistant, healthy, vigorously growing landscape when rainfall is inadequate or infrequent.

Obtaining ample quantities of good quality water is becoming difficult as irrigation demands increase and fresh water supplies dwindle. Often lower quality water with high amounts of dissolved soluble salts is used in order to obtain adequate amounts of irrigation.

The principle soluble salts found in water are the chloride and sulfate salts of sodium, calcium, and magnesium.

The original source of these materials was from weathering of primary minerals. The oceans have become the eventual reservoir of soluble salts as water has moved through the hydrological cycle. Along coastal regions of the country, seawater is intruding into fresh water supplies and contaminating them by increasing the

continued on page 62

Two watering schedules in one easy-to-program controller

That's a switch

Now, at the flip of a switch, you can have two separate watering programs. In the simple-to-operate new Mark Series of micro-computer irrigation controllers from Weather-matic.

Mark controllers have a special function selector switch that eliminates many programming steps required with a keyboard pad. An LED display shows the current time or program value. And LED lights indicate each watering day selected.

The new controllers also offer 0-99 minute timing at one-minute increments, and four daily start times on each program.

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This advanced new controller is available for 6 or 8 watering stations, in rainproof aluminum housing or economical plastic for indoor use. Or a 16-station version in an industrial grade housing with an optional pedestal. Teamed up with Weather-matic valves, sprinklers and Rain-Stat®, the Mark Series works and works and works.

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LAWN AND TURF IRRIGATION

Circle No. 153 on Reader Inquiry Card

You're responsible for a course worth millions. Sod webworms should be the least of your worries.

What's it going to be this year?

The usual sod webworms, billbugs, chinchbugs and grubs? Or perhaps nasty surprises like armyworms or cutworms?

As if this time of year isn't busy enough without insect problems, that's when they hit you.

SEVIN® brand SL carbaryl insecticide hits them back. Hard.

Without clogged nozzles or tank-mix problems. Without corroding equipment. And without protective gloves or masks.

As a water-based sprayable formulation, SEVIN® brand SL is easy to handle, mix and dispose of. So with the time available for application, you spend more time spraying. Less time re-filling.

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SEVIN® brand SL carbaryl liquid effectively controls over 25 common turf insects, including sod webworms, white grubs, chinchbugs, billbugs, crickets, even ants, ticks and fleas.

SEVIN® brand carbaryl kills insects on contact as well as by ingestion. So you get extended residual action whether pests are feeding or not. And SEVIN® brand carbaryl gives you the peace of mind that comes from knowing it's used for insect control on pets, poultry and even some game birds.

So it's ideal for insect control in golf courses, parks, and other recreational turf areas used by people.

In fact, you can put greens, fairways and other golf course areas treated with SEVIN® brand SL back into play as soon as the spray is dry.

You keep more turf area in use. And to the people who play your course, that's important.

Dependable SEVIN® brand

SEVIN® brand carbaryl is biodegradable in the environment. And there's no harsh odor to annoy players.

SEVIN® brand carbaryl insecticide is registered not just for turf but also trees, shrubs, and flowers.

So you don't need to keep track of a large inventory of different insecticides.

Ask your turf chemicals supplier about SEVIN® brand SL carbaryl insecticide. It can help put your pest problems into perspective.

From the turf care group at Union Carbide

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Circle No. 150 on Reader Inquiry Card

SALINE *from page 58*

soluble salt levels.

In the interior regions of the country, ancient saline marine deposits in geological layers add soluble salts to rainwater as it passes through the layers. This process has occured throughout the country and virtually all the fresh water supplies have some amount of dissolved salts.

Amount of salts

The amount of salts in water determines the degree of salinity and to a large extent the overall water quality. Salinity is determined by a conductivity meter which measures the electrical conductivity (EC) of a water sample.

This is determined as the inverse of the resistance of an electric current as it is passed between two probes in a salt solution.

Electrical conductivity is determined in units of Siemans per meter (S/m) or in the older units of mhos per centimeter (mhos/cm). Generally, electical conductivity is reported in tenths of Siemans or Deci-Siemans per meter (dS/m) which are equal to the old reporting unit of millimhos per centimeter (mmhos/cm).

Electrical conductivity is the preferred salinity measurement because it expresses all the salts that are associated with possible salt stress on plants from saline irrigation. The electrical conductivity and concentration of dissolved salts (parts per million - ppm) are directly related units depending on the salts present.

A sodium chloride solution of 1 dS/m is equal to 640 ppm soluble salts. Other salt solutions vary from 550 to 700 ppm for every 1 dS/m. Salinity of water samples are often compared to seawater which has an EC of 41.5 dS/m and about 35,000 ppm dissolved salts. Irrigation water has been classified into four catagories based on the salinity hazard (See Table 1). These limits were determined by the U.S. Salinity Laboratory based on the relationship between the electrical conductivity of the water and the electrical conductivity of soils to which the water has been applied.

TABLE 1.
Classification of Saline Irrigation Water.

Salinity Class	Electrical Conductivity (dS/m)	Concentration of Dissolved Salts (ppm)	Comments
Low	<0.25	<160	Low salinity hazard.
Medium	0.25-0.75	160-480	Some leaching required.
High	0.75-2.25	480-1440	Good drainage required & salt tolerant plants.
Very high	>2.25	>1440	Excellent drainage required & very salt tolerant plants.

TABLE 2.
Recommended Irrigation Amounts For Saline Water.

Irrigation Water EC (dS/m)	Maximum Plant Salinity Tolerance Level, Measured By Saturated Soil Paste Extract (dS/m).		
	4 (Low)	8 (Medium)	16 (High)
	inches of water required to replace evapotranspiration losses and provide adequate leaching.		
0.00	1.5	1.5	1.5
1.00	2.0	1.7	1.6
2.00	3.	2.0	1.7
3.00	6.0	2.4	1.8

Obtaining ample quantities of good quality water is becoming difficult ...

Water with EC readings of less than 0.75 dS/m are considered to be suitable for irrigation without many problems. The successful use of water above this level depends on the soil conditions and plant tolerance to salinity. The quality of irrigation water is also influenced by other specifications.

Amount of sodium

The amount of sodium is of prime concern because it is often found in the largest amounts. Excessive sodium destroys soil structure. Sodium is also an antagonistic ion that will displace potassium and can limit the availability of iron, manganese and phosphorus in soils.

Boron in irrigation water is rarely a problem with turfgrasses because boron accumulates in leaf tips which are removed by regular mowing. Other landscape plants may be more sensitive to boron levels.

High concentrations of chloride, sulfate, and bicarbonate ions can cause specific injury under certain soil conditions.

Soils are a key to the continued use of saline irrigation water. Good drainage is essential to leach soluble salts through the soil profile. The better the drainage, the more successful saline irrigation can keep the soil level of soluble salts within tolerable limits.

Soil texture

Soil texture also influences the use of saline irrigation water.

Sand soils with low moisture holding capacities will concentrate the soluble salts quicker than finer textured soils as moisture is lost by evapotranspiration. Sand soils are usually the best-suited for saline irrigation applications, but they must not be allowed to dry in order to prevent intolerable salt levels.

continued on page 66

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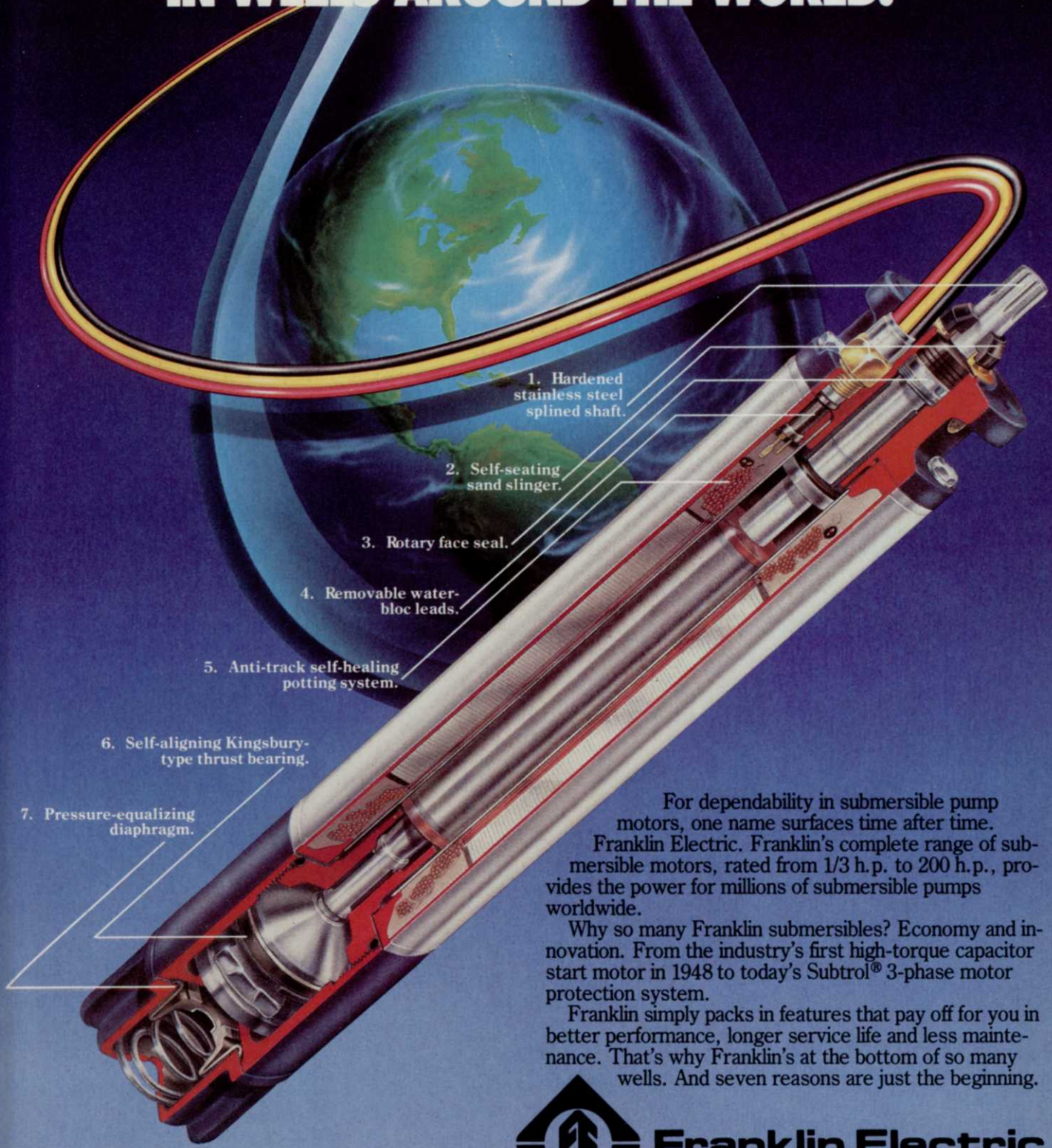

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SALINE *from page 62*

TABLE 3.
Salt Tolerance of Turfgrass Species.

Salt Tolerance	Species
Good	Zoysiagrass
	Seashore paspalumgrass
	Bermudagrass
Fair	Creeping Bentgrass
	St. Augustinegrass
	Tall Fescue
Poor	Perennial Ryegrass
	Red Fescue
	Bahiagrass
	Kentucky Bluegrass
	Centipedegrass
	Colonial Bentgrass

Soluble salts are measured in soils by the same basic method as water samples. A conductivity instrument measures the electrical conductivity from a water extract from a soil. The electrical conductivity readings of soils are two to 10 times greater than the irrigation water applied to them.

Good drainage is essential to leach soluble salts through the soil profile.

Soils with EC readings of 2.0 to 4.0 dS/m are considered to have low salt levels. Soils with EC readings of 4.0 to 12.0 dS/m have medium salinity levels. When soil readings are above 12.0 dS/m, soils are considered to have high salt levels.

To maintain a certain salt level in the soil for plant tolerance, saline water must be applied at rates exceeding evapotranspiration to leach excess salts through the soil (See Table 2).

For example, to replace 1.5 inches of water lost by evapotranspiration, approximately a week's worth of plant water use, rainwater with 0 dS/m would not increase the salinity, so 1.5 inches of irrigation would be sufficient.

TABLE 4.
Salt Tolerance of Various Turf Cultivars Used For Golf Courses.

Salt Tolerance	Creeping Bentgrass	Bermudagrass
Most	Seaside	Tifdwarf
↓	Arlington	Tifgreen
	Congressional	Tifway
	Cohansey	Tiflawn
Least	Penncross	Common

As the salinity of irrigation water increases, irrigation amounts more than the evapotranspiration amount must be applied because of the tendency to concentrate salts in the soil.

The larger amounts of water applied as irrigation salinity increases tend to keep soil salts at tolerable levels and to leach excess salts. Rainfall with saline irrigation is a definite benefit because it will aid in leaching and diluting soluble salts.

Salt stress

Applying saline water can cause salt stress and injury to plants by both direct and indirect means. Direct salt injury occurs with the accumulation of salts on the surface or ions within the plant. Reduction in plant growth and other metabolic processes such as photosynthesis are a result of direct salt injury.

Indirect salt stress and injury are caused by altering the plant environment particularly in the soil.

Osmotic stress is dehydration of the plant by removing water from the plant into the soil because of a salt concentration gradient. Some nutrient deficiencies are an indirect result of saline conditions causing suppression of nutrient absorption.

The most common example of this is the antagonistic effects of sodium on the uptake potassium into the plant. Plant resistance to salt stress varies greatly. Some plants avoid salt stress by either excluding salt absorption, extruding excess salts, or by diluting absorbed salts.

Other plants tolerate salt stress by adjusting their metabolism to withstand direct or indirect injury. In most cases the mechanism of salt tolerance in plants is a combination of methods.

Salt tolerance

Evaluation of salt tolerance of turfgrasses and ornamental plants has largely been done by observation of plants growing along the ocean or in saline sites. These observations have been further investigated by researchers in California and Florida.

Turfgrass species have been classified according to salt tolerance (See Table 4). Only a few turf species grow well under saline conditions. The grasses require good drainage and moist conditions to produce good quality turf.

Adequate leaching is also essential. Cultivars within a species often show a wide range of salt tolerance (See Table 4).

Indirect salt stress and injury are caused by altering the plant environment particularly in the soil.

Sometimes cultivar differences are greater than species differences. Most turfgrass comparisons are based on the salt levels which cause a 50 percent reduction in top or root growth.

Landscape plants like turfgrasses have a wide range of salt tolerances. Problems with these plants are often more pronounced because of direct salt injury. Landscape plants do not often have leaves removed like mowing turf, hence salts can accumulate in the leaves. Local soil and environmental conditions greatly influence salt tolerance.

More specific recommendations of salt tolerant landscape plants are available from most cooperative extension offices.

A few simple guidelines should be followed to successfully grow plants using saline irrigation.

First, use the best quality water available. Provide excellent drainage and excess irrigation to leach excess salts.

Finally, use the most salt tolerant plants for your location. **WT&T**

Augustin is Extension Turf and Water Specialist, University of Florida, IFAS, Ft. Lauderdale Research and Education Center.

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Digital Dominance

Electrical and mechanical controllers, move over. Solid state is making its presence felt in the irrigation industry.

by Jack Schember

"If it sells in California, it'll sell anywhere."

This often-quoted axiom may be accurate in describing the phenomenal success of the waterbed, hot tub and Apple computer, but will it ring true for the solid-state irrigation controller?

Manufacturers of irrigation equipment think so. They believe the digital controller will be a big hit with the nation's landscape architects and contractors.

The solid-state controller is already a hit in California. According to a survey by Irri-Trol Mfg. Inc., 70 percent of the irrigation market in California is using solid-state controllers while 30 percent are employing the electrical or mechanical versions.

"But the reverse is true once you get outside California," says Irri-Trol's Chuck Hoover. "Here we found that 30 percent were using solid-state and 70 percent were still using electrical or mechanical.

These odds help pinpoint a potentially huge market for sophisticated irrigation equipment, according to Hoover. "I think solid-state will be big everywhere pretty soon," he says.

Components dominate

Hoover was one of the more than 300 manufacturers and distributors exhibiting landscape supplies and equipment at the 1985 Landscape Industry Show which took place in March at the Long Beach (California) Convention Center.

Produced by the California Landscape Contractors Association, the sixth annual trade show attracted more than 5,000 professional contractors, architects and turf managers, according to Greg Meyer, show chairman.

"There is no other show in the West as diverse as this one," says Meyers, who is vice president of Valley Crest Tree Co.

"We have everything here from A to Z for the landscaper."

Greg Meyer, *vice president of Valley Crest Tree Co.*

Irrigation components dominated the show floor.

More than 35 companies were exhibiting irrigation products like backflow preventors, fittings, PVC pipe, drains, drip emitters, filters, pumps, sprinklers, controllers, valves and meters.

Water is lifeblood

Such displays of irrigation parts are not unusual at the yearly Landscape Industry Show, for in the arid West, water is the lifeblood of landscaping.

"Everything is irrigated here," says Mark Pedicone, a sales representative for the turf division of Rain Bird. "For a built landscape, water is essential."

With a construction boom and a strong economy in key Western cities, there is plenty of business for the irrigation industry," Pedicone says.

"There is a demand for more "localized" irrigation products. Landscape architects are designing smaller parcels of property and are specifying that zone watering and low volume irrigation be implemented. Products marketed for this style of irrigation include bubblers, drip emitters and micro spray heads.

The "water manager" is beginning to appear as a viable member of the landscaping work force. Such a specialist will typically approach a homeowner's association or a city planner and propose a water savings plan. The water manager is compensated according to how much he can reduce the water bill. "This is a big trend," Pedicone says.

New to the market is a line of valves and nozzles that makes irrigation "more efficient," says Chuck Turmell of Champion Sprinkler Co.

Champion's new In-line Y Valve, for example, reduces pressure loss and improves the flow of water, Turmell says.

"We have a line of pop-up sprinklers with matched precipitation-rate nozzles," he points out. "Even though the nozzle sizes are different, the lawn still gets the same amount of water."

Joe Silva of Hunter Industries says the landscape manager wants to simplify his sprinkler inventory and find one sprinkler "that can do it all."

Hunter's new Professional Series sprinklers can apply water from a 15-foot radius to a 52-foot radius, and from one-half gallon per minute to 11 ½ gallons per minute, thanks to interchangeable nozzles.

"The contractor can get 12 sprinklers in one, Silva says.

Hunter is planning to market a fully adjustable head with one nozzle for a multiplicity of uses, he indicates.

Solid-state controllers, zone watering, irrigation management and versatile nozzles are not the only trends to catch the fancy of the Western landscaping industry.

Larger trees

Greg Meyer of Valley Crest Tree Co. says architects are now regularly specifying larger trees for commercial sites.

"Budgets are now calling for 15-gallon and 24-gallon trees, rather than the popular five gallon trees of yesterday," he says.

At Belcourt, a swanky residential development in Newport Beach, CA, "contractors were putting in 48-inch box specimen trees like they were as inexpensive as groundcover," Meyer

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remembers. The trees cost about $800 each, he says.

Sophistication

Pointing to other trends, Meyer believes there is a direct relationship between landscaping and real estate marketing.

"Landscaping is worth the initial investment because it will pay off handsomely once the building or house is sold," he says.

Many landscape architects and contractors are working closely with developers in building corporate office parks where landscaping is used to lure clients, Meyer confirms.

In short, Meyer says, the industry is becoming more sophisticated, "even down to the homeowner level." He says homeowners are demanding quality workmanship and this in turn breeds higher standards for the industry."

He says the West will continue to be "a haven for architects and landscape contractors" as long as the climate, economy and the outdoor-oriented lifestyles of the people remain unchanged. **WT&T**

Jack Schember is the former editor of *Western Landscape News.*

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Towing the Line

A preventive maintenance plan is the cornerstone of Wayne Poe's streamlined program at First Colony.

Steve Poe mows around *a man-made lake with a Deere F910.*

In the last five years Wayne Poe has hired more than 60 grounds maintenance workers and purchased dozens of mowers and a fleet of tractors. He's trying to keep up with the expanding grounds maintenance duties of a rapidly growing planned community called First Colony in Sugar Land, about 10 miles west of Houston, TX.

Poe moved to Sugar Land in 1967 to be a farm manager for a corporation that owned about 4,200 acres of farm and pastureland. In 1972 the corporation sold the land to Sugarland Properties Incorporated, a land development organization that intended to create a planned community where Poe had been running cattle.

He stayed on as grounds maintenance manager for the new company and sometimes smiles at the irony of his new position.

"I decided it would be easier to change from farming and ranching and try to make the grass grow where before I tried to kill it all the time," Poe says.

Sleeping giant

For the next 12 years Poe and a crew of four workers handled the grounds maintenance duties while Sugarland Properties acquired nearly 10,000 acres of land and completed a master plan for controlled development of residential, commercial and retail store areas in what would someday become a city of 100,000 people.

"We had one push mower and two 1958 John Deere 730 tractors in those days," Poe reminisces. "Then one day in 1980 our executive vice president said to me,'You better start buying some equipment because in 12 to 18 months you're going to have about a hundred people out here mowing grass.' At first I laughed. Then I asked, 'Is it really going to move that fast?' And sure enough, within 18 months we had around 80 employees on grounds maintenance. Now I have 65 people in my crew and the commercial division has another 28. We can have as many as 115 people working out here."

The Sugarland crew mows about 400 acres every week and keeps it clear of trash. The people work five 10-hour days a week, including 10 hours of overtime. They get an hour for lunch and two weeks of paid vacation.

Poe fills in with part-time help during the summer vacation months.

Poe had no trouble finding people. He said people still come in every day looking for work. But he did have some problems finding people who shared his concern for preventive maintenance.

"When I interview a person, I say straight out—if you're going to mistreat the equipment, I'm going to send you right out the door!" he says. "I try to get the best equipment I can for the crew to work with and I expect them to keep it like new."

Lots of grease

As his staff and equipment needs have grown in the last five years, his emphasis on preventive maintenance has continued. "We use a lot of grease", he explains. "We grease the equipment every morning and we grease it again after lunch. I insist on it because grease is cheaper than parts and a lot easier to put on. And I'm picky about changing oil. For push mowers we change the oil every 50 hours. The larger tractors we run 100 hours between oil changes. We have some machines that get new oil and oil filters every Saturday morning. Now some people may say I'm wasting lots of good oil, but I've got a 1977 Deere tractor out here that you can work just as hard as you want to and it won't use a drop of oil."

Cleanliness is another part of Poe's preventive maintenance program. His crew washes every pickup truck and mowing machine every working day. One reason for daily washing is public image and salesmanship.

Customers and executives are touring the property every day so the equipment has to look well-maintained to help reinforce the image of a well-planned, well-run community development.

But cleanliness also has its maintenance advantages. Poe says, "We scrape and wash every mower deck every night. I tell the crew to keep the machinery clean enough that you can sit on any piece of equipment in the shop and eat a sandwich. I have three-

Wayne Poe monitors hours *of equipment use to be sure that crankcase oil is changed every 100 hours on a tractor, every 50 hours on a push mower. Carl Smith checks the oil.*

year-old mower decks without a spot of rust."

Poe says he doesn't rely on checklists or paper work to keep track of preventive maintenance work because he monitors it all the time and his crew people know that they must take care of the equipment.

Poe goes a step further by instilling pride in his workers. He uses several techniques to help the crew take pride in their machines and their work. Sugarland Properties provides uniforms and caps for every grounds maintenance employee. Each employee pays $8 a month for five uniforms and weekly laundering.

Each worker is assigned to an individual machine. And Poe spends an hour every night helping the crew wash, wax and polish the mowing machines. "We want to look first class because we're a first-class outfit," he says.

Poe has had some employee turnover problems, but 75 percent of his staff has been with him for two to three years. After six months of employment, employees receive family major medical insurance and dental plans for $39 a month and a week of paid vacation.

Equipment

In the last five years Poe has purchased three dozen push mowers and 10 tractors ranging from 14.5 to 80 hp. "I look at the quality of the machine," Poe says. "I want something that will last. I consider the performance of the equipment and its safety features. Price is the last thing I look at. When an equipment dealer shows me a machine that meets my expectations, then I start chewing on the price. But I don't mind paying a little more for something that will hold up."

The Sugarland groundskeepers mow the Bermudagrass to 1 1/4 inches from 50 to 56 times a year, fertilize it twice, and overseed with winter rye. The operation continues year round.

Poe tries to have enough equipment on hand to keep a full crew going even when a machine breaks down. Two mechanics handle repairs and draw parts from a well-stocked supply.

"We carry a good-size parts inventory for every piece of equipment. If I need one part, I'll buy two and keep one on a shelf. When I reach for that one, I call the dealer to order another one. That helps because you can catch a dealer short."

When buying new equipment, Poe looks for certain safety features. He likes safety devices that keep a machine under control if something happens to the operator.

Because the crew people work in residential areas where street traffic and pedestrians can pass near, it's critical that a tractor have something like a seat safety switch that automatically shuts off the engine should the operator dismount while the mower is engaged.

He also looks for safety devices that protect a passersby from objects thrown by a mower blade. Many of these safety features help protect the crew as well.

Poe provides safety glasses and a safety vest for operators to wear. Employees are forbidden to wear tennis shoes.

"I want to take care of my staff just like I'd want someone to take care of me. I spent time in the oil fields and I've seen where safety is a big factor in whether or not you walked away from a rig under your own power."

Sugarland's grounds maintenance staff is organized into two divisions—one crew that maintains the 36-hole golf course and other sports facilities including tennis courts and swimming pools, and one division that maintains the boulevard strips within the planned community and the corporation property that surrounds the 20 residential areas, and the industrial and commercial parks.

Owners of single-family houses, apartment complexes and condominiums are responsible for their own grounds maintenance. Many of them would like Poe's crew to handle the work but he has to keep growth under control.

Several private mowing contractors help keep the community trim without adding to Poe's staff.

Poe manages the general property maintenance division.

His staff is organized into five groups with a crew leader and six groundskeepers. A 12 to 15 member crew mows the large, open areas.The whole 400 acres is mowed in three days. The rest of the week is used for cleaning up trash.

"I try to keep the respect of my crew people because if you don't have their respect, they're not going to do a good job," Poe said. "I like to stop someone every once in a while and say 'Hey, go get yourself a drink of water.' Then I'll grab his mower and work with it a spell. I won't ask anyone to do something that I wouldn't do or haven't done."

Poe believes that a manager must be firm with his employees, but at the same time respect them as individuals.

Incentive

One way he shows respect and concern for the crew is simply patting a person on the back when he does a good job. Another way is to trust the crew to do whatever it takes to keep First Colony in first-class trim.

Because the Sugarland crew works from 6 a.m. to 7 p.m., it's often difficult for the workers to get to the bank on payday or handle other errands during business hours. And some things can't be done on Saturdays.

Poe devised a plan that gives the crew a half day off on paydays if it completes the weekly tasks within four days. The workers appreciate the time off to handle their personal business and therefore don't ask for extra time off during other days of the month, unless there is a family emergency.

Poe's management style has allowed him to keep pace with the rapid growth of First Colony.

The planned community has a population of 20,000 now and will soon increase to more than 100,000. Maintaining top-quality grounds maintenance work for an operation that's expanding every day requires a firm hand. And as Poe is quick to point out—a fair person who treats people with respect. **WT&T**

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Circle No. 131 on Reader Inquiry Card

PROBLEM SOLVERS

by **Balakrishna Rao,** Ph.D

Growth regulators OK

Problem: *Can growth regulators or retardants be used on southern grasses such as on 'Floratam' St. Augustinegrass in Florida, etc.? (New York)*

Solution: Yes, growth regulators or retardants can be used on southern turfgrass like St. Augustinegrass. In a 1983 issue of WT&T, I responded to a similar question regarding growth regulators available for use on St. Augustinegrass to reduce mowing frequency. For your convenience, I am reprinting that information below.

Mefluidide (Embark-25) has a label registration for use on St. Augustinegrass. Reports indicate that one application of Embark at a rate of one pint per acre in 15-150 gallons (depending on the application equipment) on St. Augustinegrass has provided growth suppression for eight weeks.

This material will inhibit cell division and cell elongation without affecting the root system. Ideally, the material should be applied when the grass is actively growing in spring and fall.

If the turf is irrigated, Embark can be used any time during the growing season. Depending on the stress condition, turf may show temporary discoloration in response to treatment.

For best results, apply the Embark when the turf grows a little taller than the normal mowing height or spray two to three days after mowing. After the application, wait for five to seven days and then mow if necessary. Follow normal turfgrass fertilization and conventional weed control programs along with irrigation.

It is important to apply the material uniformly; otherwise, the results will be variable.

Another product, maleic hydrazide (Retard) also has been used commercially for turfgrass maintenance; however, information on its use on St. Augustinegrass is lacking. Therefore, if you wish to use this product, first try it on a small test plot and study the growth response. For best results, read and follow the label specifications.

Splitting bark a mystery

Problem: *In reading your article in the April 1984 issue, I would also like to comment about winter damage. In the middle of July I lost a 3"-3½" caliper Salix babylonica (Babylon Weeping Willow) and five of my Salix matsudana tortuosa, (Hankow Contorted Willow). The others have split their bark in several areas running from the base of the tree up to the first group of limbs, which varies from 6'-8' above ground.*

I have contacted the county extension agent and he said since we had a bad winter, dry June and wet July that the trees just couldn't take the amount of moisture going into the tree. I have sprayed for insects and put pruning paint on the splits. I also did a soil sample. It is still a mystery to me about what's happened and would like more advice or any help on what to do. (Georgia)

Solution: Most plants are sensitive to exposure to extremes in temperature and/or moisture. The type of injury(ies) and loss of plants you have observed could possibly be related to these abiotic factors alone or in combination with other biotic factors, such as disease or insects. We have seen extensive winter injury symptoms on a number of plants in many areas during the past several years. Based on these experiences and your county extension agent's diagnosis of the problem, I believe that the problem is related to winter injury.

Therefore, in addition to the treatment you have already done, consider pruning the dead portion of the trees, fertilize, and water the plants as needed to help improve vitality.

Three to six week wait

Problem: *How long should we wait to reseed a lawn after applying broadleaf herbicides? Secondly, how long should we delay broadleaf herbicide applications in a newly seeded area? (Michigan)*

Solution: Generally, waiting for three to six weeks after broadleaf herbicide applications is sufficient to reseed the area. Reports indicate that with a splicer seeder, herbicides can be applied at or prior to seeding with no significant turfgrass reduction. Experience suggests that broadleaf herbicide applications should be delayed during establishment and at least until two to three mowing periods.

Weed control for centipede sod

Problem: *When and what is the best time to treat centipede sod for weed control? Also, what is the best treatment for wild turnips in centipede sod? (Alabama)*

Solution: In your area, the best time for treating centipede sod for weed control would be in the spring and fall.

Broadleaf herbicides like Trimec containing 2,4-D, MCPP and dicamba do not have preemergent activity. Therefore, for best results the weeds have to be present and, ideally, should be actively-growing when the application is made. On centipedegrass, use a bentgrass Trimec formula containing a low amount of 2,4-D.

To avoid potential injury to centipedegrass, do not use a regular Trimec formula which contains a higher rate of 2,4-D. For controlling wild turnip plants in centipede sod, use bentgrass Trimec in the spring, preferably before they bloom and again in the fall if the weeds are present. Read and follow label specifications for best results.

Natural turf is "king" in Bahrain

Grass may or may not be greener on the other side of the fence, but halfway around the world, in the nation of Bahrain, it's certainly more appreciated.

Growing quality turf is a stern test for a Mobile, AL, man who went to Bahrain about seven years ago as a vacationer and now serves as an advisor for turf sporting facilities on this desert island.

Earl Stone, a soft-spoken golf architect, spends several months each year developing a golf course, a horse racing track, and world-class soccer pitches in tiny Bahrain, located just east of Saudi Arabia.

Quality turf can be grown in the desert, says Stone, but it's expensive. The biggest problem is water, not only its scarcity, but often its quality, Stone discovered while designing the country's first turf golf tees and greens at the prestigious Bahrain Equestrian & Horse Racing Club Golf Course.

Water for irrigation is scarce (Bahrain gets about two inches of rain annually), and it must be supplied by wells. But, with a pH of about 10 and a salinity of 2,000 parts per million of total dissolvable salt (ppm TDS) at the golf course Stone developed, the water isn't suitable for growing healthy grass.

Stone says the water is first diverted through a "pre-treatment" plant where sulfuric acid is added to reduce the pH (costing the government an estimated $250,000 annually). Then the water goes to a reverse-osmosis desalination plant which, when the membranes are new, drops the ppm TDS to about 900. Constant attention must be given to the plant because of the corrosive effect of the salt water on the membranes which normally last about two years. As the membranes deteriorate, the salinity of the water rises.

This past winter the water registered 1,000 ppm TDS, a level usually considered too high for growing healthy turf.

"We feel like we're getting away with this level because of the leaching effect of the sand," Stone points out. "We were watering ½ inch daily and we feel the salt is leaching right through the root zone."

Sometimes even getting the turf to the site is a major undertaking. In building the country's first grass tees and greens (Bahrain has two other golf courses but they're entirely sand), stolons of Tifton 419 Bermudagrass from Mississippi Grass Nursery, Hattiesburg, MS, were refrigerated and air-freighted to the course.

Bermudagrass, even though it goes dormant because of shortened winter days, is the favored turf for most playing surfaces on the island, including the new soccer pitches Stone is overseeing.

"The government hopes to have the best looking fields in the world for the 1986 Arabian Gulf Cup competition," Stone reports. It's a point of international pride for this small country that now boasts $200 million in athletic facilities.

The Tifton 419 Bermudagrass soccer pitches are overseeded each November with Prelude, a turf-type perennial ryegrass marketed by Lofts Inc. Moderate winter temperatures (from about 50 degrees F. in the morning to 70 degrees F. in the afternoon) provide ideal conditions for the ryegrass, Stone says. Also, water quality in the area of the pitches is significantly better than in other parts of the country.

Natural turf's ability to survive the desert conditions could be signaling the end of Bahrain's dependence on synthetic turf soccer fields.

"They're tearing out all the artificial surfaces," Stone reports "You can imagine the temperature on one of those pitches with artificial turf. (Summer temperatures of 110 F. are common in Bahrain). I can't imagine how they can stand to play on these things."

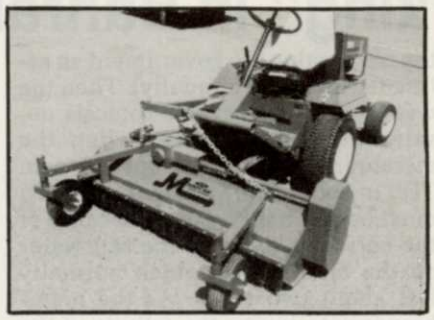
How are residents of Bahrain reacting to the turf facilities?

Stone reports it's common to see golfers remove their shoes before stepping onto a green for a putt.

Turfgrass experts inspect *18th green at Bahrain Equestrian & Horse Racing Club Golf Course. Pictured (l to r): Earl Stone, Dr. Tim Bowyer, Mohamed Ali Taha, Stan Cath, Dr. Jim Watson, and Barry Gregson.*

National Stadium *in Manama, Bahrain, is planted in Tifton 419 Bermudagrass, overseeded with Prelude perennial ryegrass.*

Vrisimo flail mower fits leading machines



Vrisimo Mfg., Inc., points to the adaptability and versatility of its new front mount flail mower, the Mighty Max FMS 160. The unit can be used with leading turf maintenance machines such as Toro, John Deere, Hustler, Turf Blazer, and Ransomes.

Vrisimo reports the FMS 160 can also be converted to a dethatching machine by simply changing the blades which cut with a vertical action and follow undulating ground contours.

In addition to the front mount FMS 160, the Mighty Max's 3-point hitch, PTO-powered, tractor-drawn models are also available for the grounds maintenance market. The basic Category 1 Mighty Max cutting widths are 46, 58, and 70 inches. The Super Category 1 has heavy-duty features and comes in cutting widths of 46, 58, 88, and 100 inches.

Circle 190 on Reader Inquiry Card

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Circle No. 126 on Reader Inquiry Card

Jobe's insecticide spikes for specific plants

Jobe's new insecticide spikes with fertilizer contain Di-Syston, a widely tested systemic insecticide. This is the first time Di-Syston has been used in a slow-release outdoor spike, the company says.

The new products—each formulated and sized for specific plants-include insecticide spikes for: trees, evergreen trees, young trees, roses, evergreen shrubs, and flowering shrubs. The spikes (tree insecticide spikes come 5 per package, the smaller shrub spikes 10) come in round cylinder containers that are safe and childproof.

Jobe's says the spikes, which are hammered into the ground, are safer and more convenient to use than traditional insecticides.

Circle No. 191 on Reader Inquiry Card

Kalo's Hydro-Wet granules help water find roots

A granular formulation of Hydro-Wet, a soil and turf wetting agent, is now available from Kalo, Inc.

Hydro-Wet works by modifying water's surface tension, allowing it to penetrate hard soil or dense thatch and reach plant roots. The product is recommended for groundskeepers and turf professionals who are looking for a way to drain excess moisture off turf without aerification on dry, hard-to-water areas.

Kalo reports the use of Hydro-Wet can reduce water use 30 to 50 percent. By increasing the efficiency of water,

the wetting agent improves the efficacy of fertilizers and pesticides, making turf better able to resist fungus and other damaging diseases associated with excessive moisture. Hydro-Wet works in all soils and helps eliminate brown or bare spots, its manufacturer says.

Circle No. 192 on Reader Inquiry Card

National Mower announces new out-front reel unit

The 30FTN mower is a strong entry into the out-front reel mower market by National.

It features individual wheel clutches (located at the hand grips), adjustable handlebars, and hand-operated height adjustment. National is touting the maneuverability and low maintenance features of this mower which comes with front caster wheels and pneumatic turf tires.

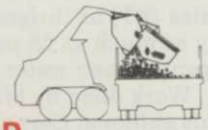
The full-floating cutting unit of the 30FTN provides a 30-inch cutting width and follows ground contour without skip or scalping. It is powered by a 5-hp Briggs & Stratton, gear-reduction engine.

A large-capacity catcher is available as an option.

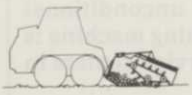
Circle No. 194 on Reader Inquiry Card

ROCKHOUND TEACHES THE ABC'S OF GROUND PREPARATION

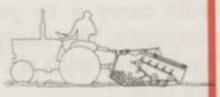
A SERIES ROCKHOUND



Dumping



Skid Steer Mount (Hydraulic)



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Brouwer introduces large capacity vac

With a 350 cubic foot load box capacity, the new Brouwer Vac is designed for big jobs. It features a hydraulically operated suction head, floating head to follow contours, rear unloading gate, and is self unloading.

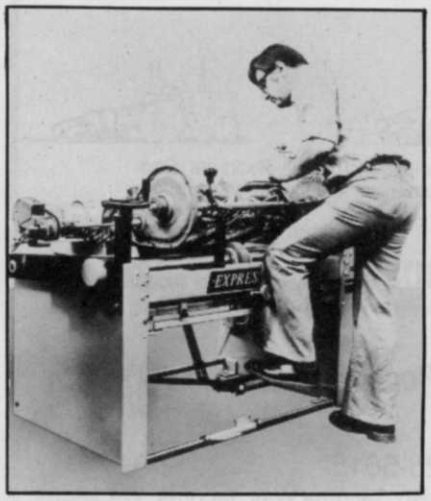
The unit can be towed by most 35 hp tractors equipped with 540 rpm PTO and travels on dual flotation tires for reduced compaction. The Brouwer Vac also offers an optional extension suction hose which allows for pick-up of litter and debris in hard to get spots.

Circle No. 193 on Reader Inquiry Card

Reel mower sharpening machine made in England

A network of 45 distributors carry a British-made reel mower sharpener. The Express Dual automatic spin sharpening machine sharpens all types of reel mowers in under 20 minutes (domestic walk behind and greens trimming types in four minutes), according to Bernhard & Company LTD.

Wearing parts of the Express Dual carry a three year warranty, while the UL/CSA motors and electronic controls carry a 10 year unconditional warranty. The sharpening machine is backed up with six service centers in the U.S.



Circle No. 195 on Reader Inquiry Card

PETROVIC *from page 42*

pacted will not alleviate compaction.

Thatch development

There is little or no evidence to suggest that wetting agents reduce thatch accumulation.

In two long term studies of eight and 10 years (Murray and Juska, 1977; Engle and Alderfer, 1967), it was found that wetting agents had either no effect on or a slight increase in thatch accumulation.

Adding a wetting agent to an existing site which is already heavily compacted will not alleviate compaction.

More recent work at Cornell University by Dr. Richard Smiley has also shown no effect of wetting agents on thatch development.

Enhancing efficiency

Wetting agents obviously can have a major impact on water efficiency where LDS occurs. On wettable soils, it has been shown recently by Dr. Robert Shearman of the University of Nebraska that the evapotranspiration rates (ET) of turfgrass were reduced by as much as 25 percent by wetting agents, when water was not limiting.

Work done by Mark J. Carroll and this author at Cornell University suggests that the reduction in water loss (ET) or a saving on water was a result of having less water available for transpiration because of the greater loss of free water to drainage.

This would indicate that wetting agents would probably not improve the water use efficiency (the amount of water needed to produce a given amount of dry clippings) of turfgrass if they just reduced the amount of water available for transpiration.

Wetting agents have a useful place as one of the tools available to turfgrass managers. As more and more is learned about the benefits and shortcomings of wetting agents for turfgrass, refinement in application strategies can be made for the benefit of those who may decide to incorporate them into their turfgrass management regime. **WT&T**

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A sample of Super Trimec that will let you prove to yourself that it is the most efficient herbicide on the market for immaculate, weed-free turf.

To date we have sent out some 10,000 samples of Super Trimec to turf professionals who requested one.

Obviously, the follow-up response has been overwhelmingly positive, which explains why we are so eager to get a sample of Super Trimec in your hands.

We make the flat statement that, dollar for dollar and acre for acre of immaculate weed-free turf, Super Trimec is the most efficient herbicide on the market . . . period.

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For starters let's talk about immaculate, weed-free turf. Super Trimec has an unparalleled broad spectrum. It handles toughies like ground ivy, oxalis and spurge as efficiently as the old-fashioned herbicides control dandelions.

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And now for the best part: the Super Trimec label says two pints per acre. The label of our worthy Contemporary says four pints per acre. That means twice as much chemical at a time in history when everything indicates that the wave of the future is for less chemical per acre . . . not more.

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CAREER OPPORTUNITIES. ChemLawn is now accepting applications for the positions of Lawn Specialist in our expanding Florida markets. Join the Nation's Leader in Lawn Care. Send resume to WTT Box 362 9/85

LAWN CARE MANAGER—A commercial and retail lawn care company in Pennsylvania is seeking a key management person. We need a motivated, personable self-starter. This person must have comprehensive lawn care and business skills—excellent compensation package offered. Please send resume to WTT Box 364. 8/85

POSITION AVAILABLE: The City of Burlington, Iowa is seeking a Tree Trimmer/Equipment Operator. One year practical and verifiable experience in large tree trimming, ornamental tree trimming, and equipment operation. Experience with rope and saddle without the use of tree gaffs. Arborist training may be substituted for 6 months experience. Minimum of high school education or applicable technical school training required. Salary 1238 to 1416 per month, insurance, vacation and leave benefits. Send resume to Personnel Office, City Hall 4th and Washington, Burlington, Iowa 52601. Closing date August 15, 1985. 7/85

SALES PROFESSIONAL to the Green Industry for Eastern market expansion; a sales professional with 2 years experience selling to lawn care, landscape and arborist firms. Must have work knowledge of the business, as well as customer needs. Excellent compensation package offered. Please send resume to WTT Box 363. 8/85

Knox College is seeking a Director of Grounds. Primary responsibility includes care of athletic fields, trees and shrubs on campus. Preference will be given to persons having a successful experience in supervision and management roles with a thorough knowledge of pruning, pest control, fertilization, turf grass maintenance. Possession of an Illinois Certified Pesticide Applicator License or ability to obtain within at least three months of employment. A degree in Horticulture would be helpful. Submit letter of application and resume to: Knox College, Personnel Office, Galesburg, IL 61401. EQUAL OPPORTUNITY EMPLOYER. 7/85

OPERATIONS MANAGER- Grounds maintenance firm in Florida is seeking an individual to manage and direct the lawn maintenance division. Previous experience in multi-crew organization, knowledge of equipment, chemical programs and ornamentals a must. Strong people and management skills. Mail resume to: Personnel Dept., P.O. Box 16123, Clearwater, FL 34279. 6/85

The city of Dodge City, KS is taking applications for the position of Forester in the Parks Department. For more information and to apply contact: Personnel Office, 705 First Avenue, Dodge City, KS 67801 by July 26, 1985. EOE M/F/H. 7/85

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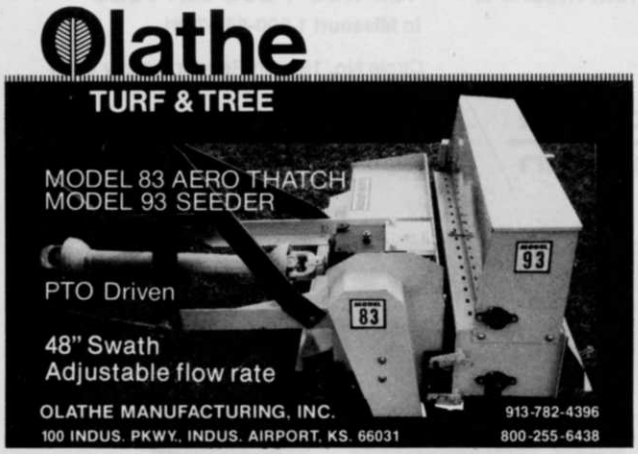

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WANTED: Large Lindig and Royer Shredders. Lewis Equipment, 320 Third Street S.W., Winter Haven, FL 33880. (813)294-5893. 9/85

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KELWAY® professional **SOIL ACIDITY** and **SOLUBLE SALTS TESTERS,** available from distributors nationwide. HB-2 and SST brochures from **KEL INSTRUMENTS CO., INC.,** P.O. Box 1869, Clifton, N.J. 07015. (201-471-3954). 9/85

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Flo Fox is a professional photographer. She is legally blind.

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EVENTS

AUGUST

Basic Interior Maintenance Technician Short Course, Aug. 10, Holiday Day Inn/Holidome, Denver. Contact ALCA office, 405 N. Washington St., Falls Church, VA 22046. (703) 241-4004.

ALCA Advanced Landscape Supervisor Workshop, Aug. 16-17, Hyatt Oak Brook, Chicago, IL. Contact ALCA office, 405 N. Washington St., Falls Church, VA 22046. (703) 241-4004.

ALCA Landscape Supervisor's Workshop, Aug. 23-24, Marriott LaGuardia, NY. Contact ALCA office, 405 N. Washington St., Falls Church, VA 22046. (703) 241-4004.

SEPTEMBER

International Garden Horticultural Industry Association Convention and Exposition, Sept. 3-7, Louisville Convention Center, KY. Contact LeRoy Rench, IGHIA, 26 Pine St., Dover, DE 19901. (302) 736-6781.

Advanced Interior Maintenance Technician Short Course, Sept. 7, Airport Hilton, Atlanta. Contact ALCA office, 405 N. Washington St., Falls Church, VA 22046. (703) 241-4004.

To insure that your event is included, please forward it, 90 days in advance, to: WEEDS TREES & TURF Events, 7500 Old Oak Boulevard, Cleveland, OH 44130.

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"At Loxahatchee Club, Sta-Rite submersible turbine pumps proved to us they're the best for dependability and quiet operation!"

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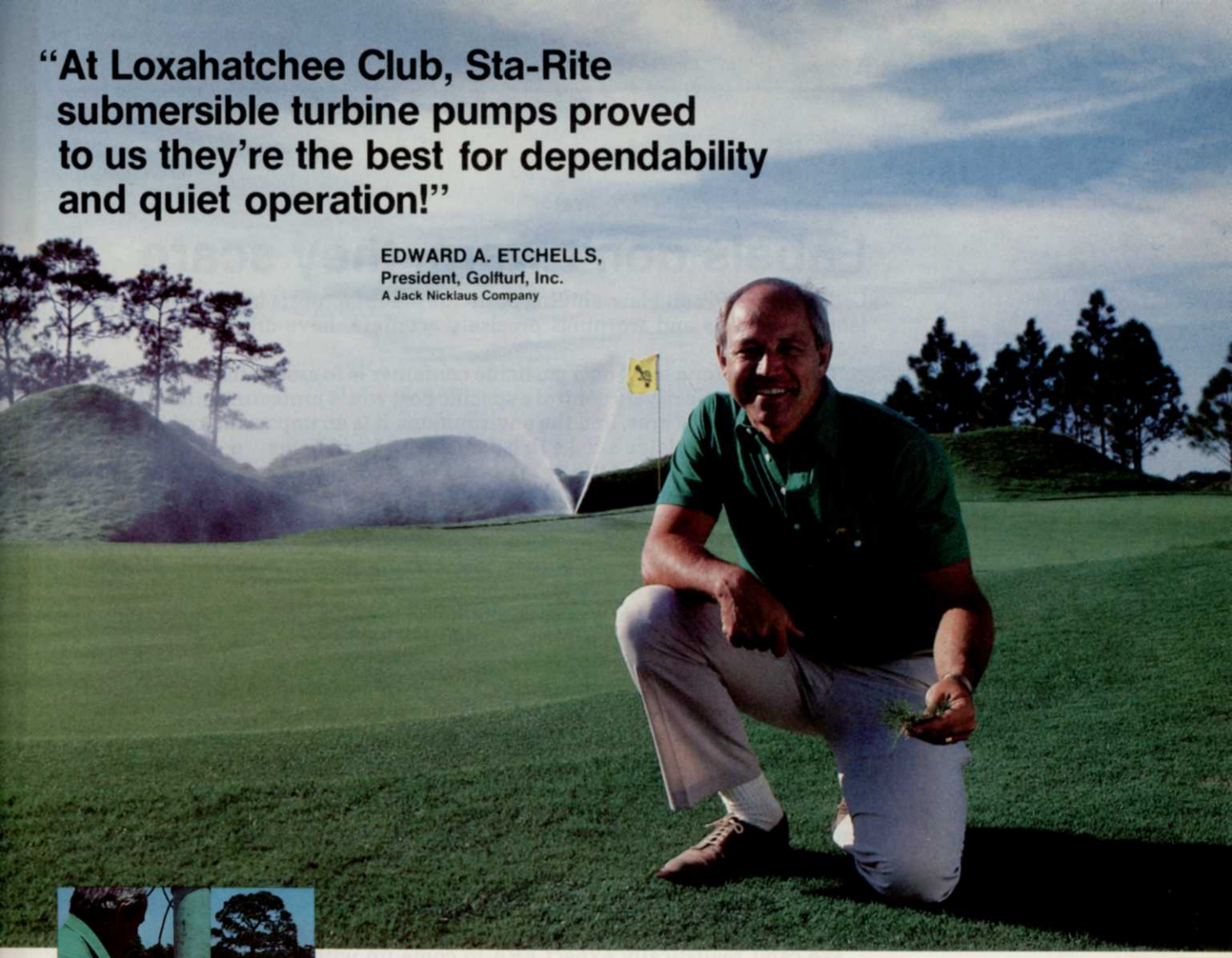

April 1984 - pumps installed; June 1984 - grassing and irrigation begins; October 1984 - greens and fairways take shape; December 1984 - course playable.

From sugar sand to playable course in six months through one of Florida's driest seasons... Sta-Rite pumps met the challenge! "The grassing of the new Loxahatchee Club in Jupiter started in June, 1984, and for the first month, we ran our three Sta-Rite submersible turbines 24 hours a day," says Etchells. "That's nearly 2,500,000 gallons of water daily. Then, for the next 90 days, they were slowly brought down to normal watering cycles of 600,000 to 900,000 gallons daily."

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A 85-3

Labels don't warn, they scare

Let's face it, EPA and law-abiding pesticide manufacturers in their zeal to make label directions and warnings precisely accurate, have created a monster, a scary monster.

The reason for a label on a pesticide container is to assure that the applicator knows how to effectively control a specific pest while protecting himself, people in the area, and the environment. It is an important tool in keeping a pesticide's risks in balance with its benefits.

It is doubtful today whether most labels accomplish this purpose, are read at all by most applicators, and, if read, are intelligible to the majority.

Furthermore, some municipal lawmakers are requiring applicators to provide customers and neighbors of customers with labels as a preapplication warning.

The label was never intended to be a preapplication notification for a customer or his neighbors. Imagine how a housewife feels when a stranger (an applicator) knocks on her door, hands her a little booklet filled with five syllable scientific words, and informs her he will be spraying the neighbor's property within 24 hours. The result is a predictable overreaction by the customer.

A completely different document should be designed for prenotification, one that clearly, and simply, explains the benefits and risks of pesticides. The benefits of the chemical should receive the same importance on the handout as the skull and crossbones. The appearance of the handout should be pleasant, not harsh and depressing.

It is completely feasible and fair to provide the necessary information about reentry, drift protection, and antidotes in a pleasant form rather than a Halloween or *Thriller* form.

We can't realistically expect EPA to come up with a creative and pleasant design. It will take an artist, not a scientist, to pull it off.

Bruce F. Shank

by Bruce F. Shank, executive editor

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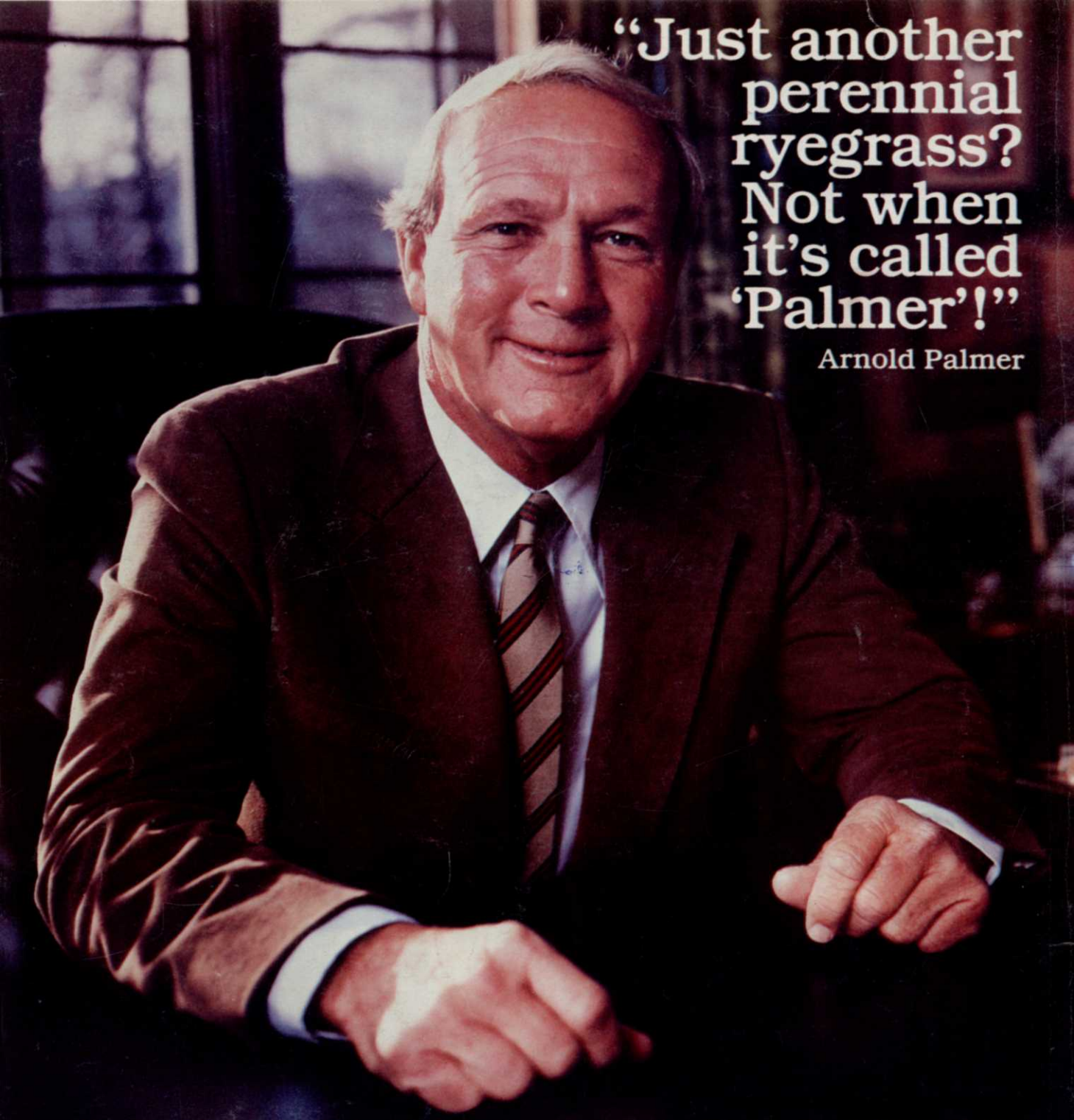

"If a ryegrass is going to be named Palmer, it would have to be very special. And believe me this one is.

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